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ON-LINE VEHICLE MAINTENANCE DATA MANAGEMENT: MODEL SYSTEM SPECIFICATION AND TEST RESULTS

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UNITED STATES AIR FORCE
Hanscom Air Force Base, Bedford, Massachusetts

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VEHICLE MAINTENANCE DATA MANAGEMENT

VIMS

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

Air Force vehicle maintenance data management is supported by the Vehicle Integrated Management System (VIMS), a standard base-level batch data system. Functions which could profit from on-line access to VIMS were identified and incorporated into an on-line system model in the Data Handling Applications Center. Teams of vehicle maintenance specialists were brought to the Center to evaluate the model. Their comments, together with the model specification, form a requirements and design base for an operational prototype system.

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Volume II presents the model specification and test results, Volume III documents model software and data base, Volume IV presents prototype development guidelines, and Volume I summarizes these same topics.

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SECTION I

INTRODUCTION

BACKGROUND

The Vehicle Integrated Management System (VIMS) is a base-level management system that processes data related to vehicle maintenance. The Air Force currently has more than 100,000 vehicles being maintained at approximately 500 sites. Most of these sites are Air Force bases, where vehicle maintenance data is collected and processed daily on the Burroughs B3500 computer. The daily, weekly and monthly reports generated by VIMS provide the necessary data to support vehicle maintenance management at all levels, including daily operations, squadron level, and higher headquarters management of the fleet.

The Directorate of Logistics Systems at the Air Force Data Systems Design Center (AFDSDC) is responsible for the implementation and maintenance of the VIMS software and for the establishment of the operational procedures for its use. In the latter part of FY74, ESD/MITRE conducted a brief study and evaluation of VIMS for AFDSDC that explored possible alternative techniques for improving the handling of vehicle maintenance management data. The results of that study were reported in ESD-TR-75-1, "Air Force Vehicle Integrated Management System (VIMS) Data Handling Study."

This report presented some perceived strengths and weaknesses of VIMS and suggested a number of near term improvements such as the clarification of output reports through reformatting. The primary conclusion was that vehicle maintenance operations and management could benefit from on-line access to VIMS through terminals located in certain key work centers.

As a result of the FY74 study, a FY75 follow-on effort was conducted, with the objective of developing the alternatives for an AFDSDC decision regarding the implementation of an on-line VIMS prototype.

In the follow-on effort, an analysis was made of those VIMS-related functions currently being performed that might be accomplished advantageously in an on-line mode. To show how this might be done, a set of transactions was proposed. Each transaction was specified in enough detail to show how an on-line capability

might be used to assist in accomplishing a specific VIMS-related task.

The proposed transactions were implemented in a computer-based development model of on-line VIMS. The model was implemented in the ESD/MITRE Data Handling Applications Center as a design tool to assist in the subsequent preparation of specifications for a full on-line prototype. After the model was completed, it was tested for a period of three weeks by a total of ten persons who are currently assigned to the vehicle maintenance area at a number of Air Force bases. This paper reports on the results of that testing.

RESULTS IN BRIEF

The primary result of the testing was the accumulation of a large number of specific comments and suggestions that will serve as guidance for any subsequent development of specifications for on-line VIMS. Testing also generated a number of more general guidelines to specification of any similar on-line system.

Acceptance of the on-line approach was uniformly high among all ten subjects. This was attributable to the fact that 1) current manual procedures were strongly paralleled in the on-line procedures, 2) the on-line procedures provided some immediate and apparent benefits to the user, and 3) the model design allowed the user to remain in control over the computer.

It was concluded that the development and testing of a model by functional personnel is an effective approach to system design.

SCOPE OF THIS REPORT

Section II presents the test objectives. Section III gives a brief description of the test environment, model software and data files, and discusses the test subjects and test procedure. Section IV is a detailed description of the transactions proposed to date for on-line VIMS, updated to reflect how they were implemented in the model and hence how they appeared to the test subjects. Section V contains the comments and suggestions obtained during testing (sorted, summarized and annotated). Section VI summarizes the test results. Appendix I contains a sample of comments taken directly from the test subjects' evaluations of the model.

SECTION II

TEST OBJECTIVES

The transactions specified for the proposed on-line VIMS do not represent a major departure from the current batch-oriented VIMS procedures. The transactions are generally designed to assist with specific tasks presently performed at three work centers in the vehicle maintenance area; namely, Workload Control, Materiel Control and Reports & Analysis (R&A). The model was designed to give a realistic view of how operators at the three work centers would interact with VIMS to perform these tasks in on-line mode.

The testing with functional area personnel was intended to determine if the on-line procedures as specified and modeled were adequate to permit the operators to properly complete their tasks. It was also intended to determine if the procedures were operationally acceptable to a user in terms of dialog, visual display formats and content, data entry conventions and other operator actions.

The primary objective was early involvement of the end user during the development stages of the on-line concept, and to use this involvement to obtain evaluative feedback to serve as guidance for the specification of a full prototype.

SECTION III

MODEL AND TEST ENVIRONMENT

GENERAL

The model comprises a set of computer programs that will respond to and interact with an operator as he performs a variety of on-line VIMS transactions. The transactions are initiated and controlled from a CRT terminal. The modeled transactions represent procedures that would be followed at a terminal located in the three work centers mentioned previously: Workload Control, Materiel Control, and R&A. In addition to the CRT terminal, it is assumed that a printer would be available to each work center in order to obtain immediate hard copy as needed.

MODEL ENVIRONMENT

The model was written in ALGOL for the Data General NOVA minicomputer in the ESD/MITRE Data Handling Applications Center. The Center contains a NOVA 800 with 32,768 words of 16-bit core memory, and a large selection of peripheral devices. The Center runs under Data General's Real-Time Disk-based Operating System. System devices supported directly by operating system commands include:

- Fixed-Head Disk (1/4 M words)
- Magnetic Tape (9-track, 45 ips)
- Card Reader (400 cpm)
- Line Printer (356 lpm)
- High Speed Paper Tape Reader (400 cps)
- Console Teletype (10 cps)
- Console CRT (120 cps)
- Real-Time Clock

A number of non-system devices have been interfaced to the NOVA and are supported by MITRE-developed software. The following non-system device is required by the model:

CRT/Keyboard Display Station - This is a Delta Data 5200 Terminal with 3072 characters of scrolling refresh memory, a display area of 27 lines of 80 characters, and extensive local editing features. Transfer of data between the CRT and the NOVA may be one character at a time or by block at speeds up to 2400 bps.

The printer that was used during model testing was the system-supported 356 lpm printer.

MODEL SOFTWARE

The model software consists of a main loop and a set of transaction modules. The main loop is the control program that responds to an operator's initial request for service from a terminal and passes control to the appropriate transaction module. Upon completion of a transaction, control is returned to the main loop.

The following is a list of the transaction modules that were implemented in the model, with an indication of the work center for which the transaction is intended. Complete functional descriptions of the transactions may be found in Section IV.

Workload Control

a. OPEN. Used to open a work order.

b. RESUME. Used to resume opening a work order temporarily suspended because one-time repair limit is exceeded.

c. AMEND. Used to retrieve an open work order for review and/or amendment.

d. VDP/ON. Suspend a work order and put vehicle on VDP.

e. VDP/OFF. Remove a vehicle from VDP and re-activate a work order.

f. CLOSE. Close a work order and report disposition of all jobs.

g. WO/REVIEW. Display status of all work orders.

h. DEFER/ADD (CHANGE)(DELETE). Used to make direct additions, changes and deletions to the deferred maintenance file.

Materiel Control

a. PARTS/REVIEW. Display back-ordered parts file and allow paging for review.

b. PARTS/ADD (CHANGE)(DELETE). Used to make additions, changes and deletions to the back-ordered parts file.

c. PARTS/ISSUE. Issue parts out of the back-ordered parts file against a work order.

d. HCBS/REVIEW. Display high cost bench stock file and allow paging for review.

e. HCBS/ADD (CHANGE)(DELETE). Used to add, change or delete items from the high cost bench stock master file.

f. HCBS/ISSUE. Issue high cost bench stock items against work orders.

g. COPARS. Used to process COPARS sales slips.

Reports & Analysis

a. FUEL. Process Fuel/Oil issue slips.

b. TIME/INPUT. Process employee time cards.

c. TIME/EDIT. Process error suspense file generated during TIME/INPUT.

DATA FILES

The model was operated using a test data base that was created to represent a 100-vehicle fleet. The content and structure of the files were selected for expediency in developing the model, and do not represent the content or structure of the files that would be required for a complete prototype. Thus the test files contain only a subset of the data required for a full prototype, and are maintained and updated by the model only to the extent necessary to preserve the realism and integrity of the transaction modules as viewed by an operator at a terminal. For example, jobs that are added to a work order will be preserved since the updated work order will be displayed and used in other transactions. On the other hand, inputs such as charging of parts cost to a vehicle will not be

saved, since this data is not referred to again in the model once it is entered.

The files developed for the model include:

a. VEHICLE MASTER. Contains data for 100 vehicles. Includes static data for each vehicle and complete scheduled maintenance data for each vehicle (this file was created using actual data for 100 vehicles from the fleet at Hanscom AFB).

b. VEHICLE HISTORICAL REPAIR. Contains maintenance repair history for 100 vehicles for previous six months (uses Air Training Command (ATC)-proposed expanded set of vehicle system codes).

c. EMPLOYEE MASTER. Contains employee name, SSAN and assigned work center for 30 (fictitious) employees.

d. HIGH COST BENCH STOCK. Contains FSN's, cost, charge codes and descriptions of 120 HCBS items (taken from HCBS file at Hanscom AFB).

e. WORK ORDER. Contains copies of all work orders currently open, VDP-suspended or closed less than six days (the file was initially loaded with 32 work orders, simulating two days of activity).

f. DEFERRED MAINTENANCE. Contains a record of all jobs either deferred or VDP-suspended (the file was loaded with 26 jobs, deferred against 20 vehicles).

g. BACK-ORDERED PARTS. Contains data on all parts on order, or back-ordered and received but not yet installed (the file was loaded with data for 31 parts, ordered against 22 deferred or VDP jobs).

h. PARTS WARRANTY. Contains data on all parts installed on fleet vehicles for which a special warranty is still current (the file was loaded with 36 warranty items).

TEST SUBJECTS

Ten subjects participated in the testing. They were selected from six Air Force bases across five commands, including one subject from Hahn, Germany, representing USAFE. Table I shows the distribution of subjects according to their respective bases and work center assignments. By work center assignment, four were from

TABLE I

Test Subjects: Duty Station, Work Center Assignment, Air Force Experience and Test Team Assignment

	ASSIGNED WORK CENTER / DUTY STATION	Workload Control	Materiel Control	Reports & Analysis
TEAM 1 3 days	Hanscom - AFSC	X (32)	X (28)	X (15)
TEAM 2 5 days	Shaw- TAC	X (7)		
	Langley- TAC		X (3.5)	X (20)
	Hahn- USAFE	X (6.5)		
TEAM 3 4 days	Dover- MAC			X (20)
	Pease- SAC	X (16)	X (7)	

( ): No. of Years Air Force Experience

Workload Control, three were from Materiel Control and three were from R&A. Table I shows each subject's total years with the Air Force. The combined experience of all subjects represents 155 years, most of which has been in the vehicle or aircraft maintenance area. Table I also shows how subjects were grouped into test teams, and the duration of testing for each team.

The selection, scheduling and coordination of test subjects were all handled by a representative of AFDSDC.

TEST PROCEDURE

Preparation

After the model was completed, it was subjected to a period of in-house testing by project personnel. Three members of the MITRE technical staff and the ESD project officer each spent from one to two days in testing. Their comments were recorded, and are reflected in some of the material presented in Section V. Where possible, their comments and suggestions were incorporated in a subsequent "last pass" through the model software in which final modifications and corrections were made prior to the arrival of functional area personnel.

During this period of time the necessary training and test materials were prepared. A package of test cases was developed to insure that as many specific features of each transaction as possible would be exercised during the testing. Where possible, each case was accompanied by its appropriate source document (Operator Inspection Guide for the OPEN transaction, annotated work orders for the AMEND and CLOSE transaction, Employee Labor Cards for TIME/INPUT, etc.). A similar, abbreviated package was prepared for use during the demonstration and training phase of testing.

Testing

Introduction

When each team arrived they were given about an hour of introductory discussion. Subjects were assured that they were not being tested or evaluated in any way. It was emphasized that they were there to help evaluate a proposed system in its early development stage, and that their comments would provide guidance that would help to shape the final system when and if it were to be implemented.

Subjects were introduced to the concept of on-line VIMS and the nature of the model was explained. The model was described as a "fast file clerk," able to perform many routine clerical tasks rapidly and consistently. It was emphasized that the operator of the CRT was always in control, and always retained the decision-making prerogative; the "file clerk" was there to assist only as directed.

The concept was illustrated by talking through one transaction. A list of all of the transactions implemented in the model was presented but not explained at this time. Subjects were given a set of simplified flow diagrams and descriptions of the transactions to keep and study at their leisure.

Each subject was given a folder containing a personal history form, evaluation forms to be used at the end of testing, and several sheets of blank paper. Subjects were encouraged to write down as many questions, comments and suggestions as possible throughout the test period.

Demonstration and Training

The balance of day one for each team was devoted to demonstration and training, conducted at the CRT terminal. Using the demonstration package of test cases, a quick pass was made through every transaction to give an overview of the entire model. In this way it was possible to explain the use of the CRT and function keys in specific context rather than in the abstract. So much comment was elicited during this first run-through that the demonstration period tended to run longer than had been expected.

Testing

The general schedule for testing each day was:

1 hr. discussion
3 hrs. testing
lunch
1 hr. discussion
3 hrs. testing

although the three hour testing session after lunch was shortened for later teams to allow some discussion time before quitting for the night.

The team member from the appropriate work center operated the terminal when testing those transactions pertaining to his

particular area. Test cases were presented one by one to the subject from the package mentioned previously. The subject was given the prop simulating the appropriate source document, with a brief explanation of the transaction he was to perform, and then was allowed to proceed on his own to execute the transaction. Other team members grouped around the CRT and observed. All team members were encouraged to ask questions or to comment at any time.

This approach proved to be very satisfactory in terms of team involvement. There was a great deal of active discussion and interplay that produced a high volume of comments and suggestions, as may be seen in Section V. It was particularly helpful to have all three major work centers represented. As a result the impact of a transaction on other functional areas could be examined and discussed, and the implications of suggested changes could be explored across work centers. This kind of exchange and interplay produced comments and suggestions that should lead to a more tightly integrated package of transactions and procedures.

Data Collection

Two observers (a MITRE technical staff member and a representative of AFDSDC) recorded comments throughout the introductory, training and testing periods. At any time during testing, specific points were addressed and talked through as they came up. As a result, many of the "comments" that were recorded were not the subjects' raw comments but were rather the observer's condensation of the essence of a group discussion.

Subjects also wrote their own comments in their folders during the discussion periods, during testing (when they were acting as observers), and during off hours. Each subject also filled out an evaluation questionnaire at the completion of the testing.

An oral debriefing was conducted with each team at the end of their test period. These debriefing sessions were tape recorded and the tapes were given to the AFDSDC representative.

SECTION IV

TRANSACTIONAL DESCRIPTIONS

GENERAL

Prior to the programming of the model, a set of transactions was specified and coordinated with the Data Services Design Center. The following section repeats those transactional descriptions, updated to reflect how they were finally implemented in the model and hence how they appeared to the test subjects. Any transactions or features within a transaction that were specified but not implemented in the model are enclosed in brackets.

SYSTEM CODES

The system codes now used on the Vehicle Historical Record to indicate the vehicle subsystem(s) that were repaired are not granular enough to accurately identify repetitive maintenance. Air Training Command has developed and proposed to AFDSDC an expanded set of system codes that adds up to nine subcategories to each of forty major system codes. The expanded codes as shown in Figure 1 are used in the development model. It is proposed that this or some similarly expanded set of codes be used in the next generation of VIMS.

ACTION CODES

In the proposed on-line VIMS there is an action code field preceding each job on the work order. The field is of the form:

c/ccc

The primary action code designator is a single character that precedes the slash. Allowable codes include:

A Activiate or Assign
D Defer
S Suspend
P Post as complete
K Kill or cancel job

01 Engine
- 1 valves
- 2 heads
- 3 oiling system/sending unit/gauge
- 4 pulleys/sprockets
- 5 supercharger/blower
- 6 gaskets
- 7 vibration damper
- 8 engine mount
- 9 expansion plugs

02 Ignition
- 1 switch
- 2 wiring
- 3 resistor
- 4 coil
- 5 distributor cap
- 6 distributor
- 7 vacuum advance
- 8 magneto
- 9 rotor

03 Electrical/Lights
- 1 wiring harness
- 2 horn system
- 3 headlight switch
- 4 turn signal switch/wiring/flasher
- 5 turn sig lights/emerg flashers
- 6 parking/clearance/tail lights
- 7 headlights
- 8 stop/back-up lights
- 9 interior/instrument lights

04 Charging
- 1 generator/alternator
- 2 regulator/rectifier
- 3 drive belt/pulleys
- 4 gen/alt mounting brackets
- 5 gen/alt brushes
- 6 alternator diodes
- 7 wiring
- 8 battery
- 9 gauge indicator

05 Starting System
- 1 solenoid/relay
- 2 bendix
- 3 ring gear
- 4 armature
- 5 fields
- 6 brushes
- 7 battery cable
- 8 starter button
- 9 motor/pony engine

06 Carburetor
- 1 air cleaner(oil bath)
- 2 air filter element
- 3 accelerator pedal/linkage
- 4 internal fuel filter
- 5 float
- 6 dash pot
- 7 choke
- 8 governor
- 9 intake manifold

07 Fuel
- 1 tank/filler/cap
- 2 sending unit
- 3 fuel pump
- 4 fuel filter
- 5 fuel lines
- 6 distribution block(diesel)
- 7 injectors
- 8 selector switch
- 9 fuel gauge

08 Exhaust
- 1 manifold
- 2 heat riser
- 3 exhaust pipe(s)
- 4 muffler
- 5 spark arrestor
- 6 tail pipe
- 7 hanger/brackets
- 8 resonator
- 9 weather cap

09 Cooling
- 1 radiator
- 2 radiator shroud
- 3 fan
- 4 radiator hoses
- 5 shutter system
- 6 additives/winterization
- 7 sending unit/temperature gauge
- 8 water pump
- 9 thermostat

10 Clutch
- 1 pressure plate
- 2 clutch disc(s)
- 3 fly wheel
- 4 master cylinder
- 5 release bearing
- 6 pilot bearing
- 7 linkage/pedal
- 8 release collar/fork
- 9 slave cylinder

11 Transmission
- 1 shift lever/linkage
- 2 modulator valve
- 3 selector box/lever housing
- 4 gears
- 5 case/cover(s)
- 6 oil cooler/lines/filter
- 7 PTO assembly
- 8 transfer case
- 9 seals/gaskets

12 Drive Shaft/U-Joints
- 1 universal joint
- 2 center bearing
- 3 pillow block
- 4 PTO drive
- 5 driveshaft, rear
- 6 driveshaft, intermediate
- 7 driveshaft, front
- 8 driveshaft
- 9 yoke

13 Differential
- 1 carrier assembly
- 2 ring/pinion gear
- 3 side bearing
- 4 pinion shaft bearing
- 5 pinion shaft oil seal
- 6 axle shaft
- 7 spindle shaft bearing
- 8 wheel bearings/seals(rear only)
- 9 two-speed system

14 Wheel Alignment
- 1 balance wheels
- 2 adjust wheel stops
- 3 rotate tires
- 4 rim/wheels
- 5 steering levers
- 6 steering brakes
- 7 steering wheel
- 8 caster,comber,kingpin inclination
- 9 toe-in/turning radius

15 Steering
- 1 hydraulic pump
- 2 hydraulic cylinder
- 3 pitman/idler arm
- 4 gear housing
- 5 drag link
- 6 tie rod/end(s)
- 7 sector shaft
- 8 seals/gaskets/shims/bearings
- 9 air booster

16 Suspension
- 1 shock absorbers
- 2 control arm(upper/lower)
- 3 ball joint(upper/lower)
- 4 steering knuckle/CVU-joints
- 5 stabilizer
- 6 coil spring
- 7 leaf spring
- 8 trunnion assembly
- 9 front wheel bearings

17 Brakes
- 1 master cylinder
- 2 wheel cylinder(s)
- 3 drums/discs
- 4 linings/pads
- 5 booster assembly
- 6 pedal linkage
- 7 fluid lines/hoses
- 8 backing plate
- 9 emerg brake sys(less cables)

18 Air System/Brakes
- 1 compressor/pulley/belts
- 2 hoses/lines/valves
- 3 air governor
- 4 air reservoir
- 5 slack adjuster
- 6 brake camshaft
- 7 diaphragm assembly
- 8 semi-trailer connection
- 9 low air pres warning sig/gauge

19 Windshield Wiper
- 1 wiper motor
- 2 wiper blades
- 3 wiper arms
- 4 transmission/gear box
- 5 linkage
- 6 switch
- 7 washer system
- 8 hose
- 9 washer bag

20 Heater/Booster
- 1 core
- 2 blower motor
- 3 switch
- 4 dash control assembly
- 5 hoses
- 6 defrosters/ducts
- 7 temp control valve
- 8 air conditioners
- 9 booster heaters

21 Speedometer/Hourmeter
- 1 head
- 2 cable
- 3 casing
- 4 drive gear
- 5 hourmeter prime engines
- 6 tachograph
- 7 tachograph drive
- 8 tachometer
- 9 tachometer driver/sending unit

Figure 1. ATC - Proposed System Codes

22 Control Cables
1 throttle cables
2 PTO cables
3 choke cables
4 emergency brake cables
5 heater control
6 winch cables
7 boom cables
8 pulleys/drums/blocks/sheaves
9 hood release cable

23 Hydraulic System
1 hydraulic pump
2 lines/hoses
3 levers/controls
4 cylinders, lift/tilt
5 by-pass valve
6 outriggers
7 PTO drive
8 reservoir/level indicator
9 change oil filters

24 Turrets
1 phasing
2 hydraulics/tubing/control/motor
3 valves/seals/gaskets/O-rings
4 pistol control assy
5 cables/linkage/levers
6 ground sweep
7 shapers/screens
8 gears
9 manual controls

25 Foam C-B
1 foam tank
2 foam bag
3 metering valve
4 control valve
5 foam pump
6 CB tank
7 CB valves
8 level indicators
9 foam C-B piping

26 Valves (Other than Engine)
1 manually operated
2 electrically operated
3 hydraulically operated
4 pneumatically operated
5 foam metering/foam shut-off
6 ground sweep
7 primer
8 turret
9 water lock valves

27 Nozzles
1 valve body
2 gaskets/O-rings/seals
3 filters
4 ground cable/chips
5 flow control
6 cradles/holders
7 overwing
8 underwing/single point
9 ground sweep

28 Piping, Water/Fuel(Plumbing&Swing Joints)
1 sediment strainers
2 basket strainers
3 segregators
4 sensing lines
5 pressure regulator/valve
6 coupling/gasket
7 O-ring
8 bearings
9 support bracket

29 Pumping System/Hoses
1 pump engine(unless prime mover also)
2 PTO drive
3 pump assembly
4 filters
5 control valve
6 seals/packing
7 bottom loading system
8 hose(mainline/handline)
9

30 Hose Reel/Rewind
1 cables
2 drive motor
3 solenoid
4 drive chain/belts
5 drive sprockets
6 switch
7 brake assembly
8 wiring
9 manual rewind

31 Refueling Inspections(IAW TO 37A-1-101)
1 meters calibrated
2 water segregators
3 filters replaced
4 line & basket strainers
5 differential gauge calibrated
6 hose hydrostatic test
7 pressure regulator check
8 pressure relief or pop-off valve
9 spark check(IAW TO 00-25-172)

32 Meters/Counters
1 auxiliary engine hourmeter
2 meter/counters
3 seals
4 gaskets
5 O-rings
6 differential pressure guage
7 pump pressure guage
8 single-point pressure guage
9 hydraulic system pressure guage

33 Tune-Up
1 minor - includes clean or adjust points and plugs, set spark timing and adjust carb idle
2 major - includes renew and adjust spark plugs, renew points and condenser, adjust timing, adjust carb and check vacuum advance. Also, renew/check/clean or adjust exhaust emission devices.
3 spark plugs/injectors
4 point set
5 condensor
6 ignition/injector timing
7 cylinder compression test
8 auxiliary engine #1
9 auxiliary engine #2

34 Safety Inspection
1 see Section II, TO 00-20B-5
2 fork lift tine insp(IAW TO 36M2-2-1-4)
3 fifth wheel insp(IAW TO 00-20B-5)
4 spark arrestor check(IAW TO 38-1-23)
5 hydraulic sys insp(IAW TO 00-20B-5)
6 corrosion ctrl insp(IAW TO 36-1-52)
7 dynamometer test(IAW TO 36-1-25)
8 wheel bearings repack(IAW TO 00-20B-5)
9

35 Periodic Inspection
1 see appropriate vehicle tech data

36 Oil Change
1 prime engine
2 auxiliary engine #1
3 auxiliary engine #2

37 Oil Filter Change
1 prime engine
2 auxiliary engine #1
3 auxiliary engine #2

38 Lubrication
1 in accordance with manufacturer's recommendations and Section II, TO 00-20B-5

39 Body
1 corrosion control, major
2 corrosion control, minor
3 accident/ abuse repairs
4 upholstery/soft trim/mats/weather molding/seats(includes seat adjuster, springs and frame)
5 body and cab
6 door/window handles/knobs/remote control and regulators
7 windshield/door glass/rear glass
8 tail gate/bumpers
9 bedboards/platforms/stakes

40 Other
1 tire front/track left
2 tire rear/track right
3 fifth wheel(trk tractor)
4 towing devices(hitches, pintle hooks, lunettes)
5 rotating/pulsating beacon light(s)
6 siren/yelper
7 spotlight
8 road service
9 tubes/rims

Figure 1 (Concluded). ATC - Proposed System Codes

Code 'A' is used during work order open, work order amend or VDP/OFF to assign a job. When code 'A' is used, the secondary action code field is blank.

Code 'D' is used to specify that a job is to be deferred. The secondary action code field following the slash is used to indicate the reason for deferment. The allowable three-letter codes include:

PER Personnel not available
DFP Deferred for parts and vehicle returned to service
SKL Skill not available
KIT TCTO awaiting kit
EQP Tools, equipment or facilities not available
PRI Military priority - vehicle required for mission
FND Funds not available
ACC Vehicle awaiting investigation of accident/abuse

Code 'S' is used during the VDP/ON transaction to designate a job that is being suspended (that is, the vehicle is retained in the shop but work on the vehicle is stopped) because necessary parts are not available. When code 'S' is used, the secondary action code field is filled in as 'VDP'.

Code 'P' is used at work order completion time to designate a job that has been completed and should be posted to the historical maintenance file. When code 'P' is used, the secondary action code field is used to indicate the type of maintenance performed. The allowable three-letter codes include:

ADJ Adjusted
FIX Repaired
RPL Replaced
SER Serviced
OVR Overhauled/Rebuilt

Code 'K' is used during work order initiation, amendment or completion to designate a job that is to be killed or cancelled. When code 'K' is used, the secondary action code field is blank. A scheduled [or deferred] maintenance job that is cancelled with code 'K' is not actually cancelled, but is returned to the scheduled [or deferred] maintenance file.

SITE CODES

Data for more than one transportation activity are frequently processed by VIMS at a single base-level computer installation.

Where this occurs, each separate activity is assigned a single character site code that is used as part of each VIMS transaction to indicate to which site the data relates. In the on-line VIMS it is proposed that each transaction initiated from a CRT terminal begin with the site code, followed immediately by the transaction code. For example, for site code H the Work Order Open transaction would be:

HOPEN

If the base-level computer were only supporting a single transportation activity, the site code would be unnecessary.

TRANSACTIONS - WORKLOAD CONTROL

Open Work Order

1. AFTO Form 374 and Vehicle Serv-O-Plate are brought to workload control to open a work order for an incoming vehicle.

2. The following dialog occurs at the CRT terminal, where entries in parentheses are supplied by the operator:

```
(ATTENTION KEY)
 TRANSACTION ?
 OPEN      Normal work order
 OPENA     Accident repair
 OPENC     Contract maintenance
 OPENG     Other government agency maintenance
 VEHICLE ?
(69B01922) [Precede with 'T' for transient vehicle]
```

3. The record for the designated vehicle is located in the vehicle master file, and the scheduled maintenance indicator is checked. If any is due, it is displayed as shown in Figure 2.

4. The operator designates the scheduled maintenance jobs he wishes to assign by filling in the selection indicator as follows:

```
Y          - assign the job
N or blank - do not assign the job
```

5. After scheduled maintenance has been taken care of, VIMS checks the deferred maintenance indicator. If any jobs are on file for this vehicle including TCTO jobs, they are displayed as shown in Figure 3.

6. The operator designates those deferred maintenance jobs he wishes to assign by filling in the Selection Indicator as follows:

```
Y          - assign the job
N or blank - do not assign the job
```

7. After the operator has designated the scheduled and deferred maintenance jobs to be assigned (if any), VIMS will display a work order form in the format of Figure 4.

a. The work order number is assigned by VIMS.

**** SCHEDULED MAINTENANCE ****

VEHICLE REGISTRATION NUMBER: 69801922
CUMULATIVE MILES/HOURS: 064201

SELECTION INDICATOR	SCHEDULED MAINTENANCE DUE	MI/HRS DUE	DATE DUE	OVERDUE
( )	OIL CHANGE	067111	74348	
( )	OIL FILTER CHANGE	067111	74348	

Figure 2. Scheduled Maintenance as Displayed During OPEN

**** DEFERRED MAINTENANCE ****

VEHICLE REG NO: 69B01922

SEL IND	WORK ORDER	JOB NO.	DEF CDE	SYS CDE	WRK CTR	JOB DESCRIPTION	MATL COST	STD HRS	BIN LOC
( )	3897	03	DFP	098	230	REPLACE WATER PUMP & THERMOSTAT (74301)	20	4.0	018

Figure 3. Deferred Maintenance as Displayed During OPEN

```
WORK ORDER NO (4227)  VEHICLE REG NO(69B01922)  DATE OPENED(74335)  TIME(1343)
MGT CODE(8204)  MAKE/TYPE(P-U CHE)            DATE COMPLETED(     )  TIME(    )
R/D CODE( )  MILEAGE EXCEEDED( )    AGE EXCEEDED( )
PRIORITY(  )  MILES/HRS(      )  USER PHONE(        ) WORK ORDER TYPE( )

 ACTN  JOB SYS      WORK  JOB                                          MATL   STD
 CODE  NO. CODE OPR CTR   DESCRIPTION                                  COST   HRS
-------- ----- --- ----- ---------------------------------------- ----- ------
( /   )01 (361) (O) (220) (OIL CHANGE                              )
       01                 (                                        ) (   ) ( 0.5)
( /   )02 (371) (O) (220) (OIL FILTER CHANGE                       )
       02                 (                                        ) (   ) ( 0.5)
( /DFP)03 (098) (M) (230) (REPLACE WATER PUMP & THERMOSTAT         )
       03                 (                              /BIN 018) ( 20) ( 4.0)
( /   )04 (   ) ( ) (   ) (                                        )
       04                 (                                        ) (   ) (    )
( /   )05 (   ) ( ) (   ) (                                        )
       05                 (                                        ) (   ) (    )
( )PAGE 2

                                   REPAIR ESTIMATES:     LABOR COST($  18)
                                                      INDIRECT COST(   11)
                                                      MATERIAL COST(   20)
          (ONE-TIME REPAIR LIMIT = $  159)          EST TOTAL COST($  49)
```

Figure 4. Work Order as Initially Displayed During OPEN

b. The vehicle registration number as supplied by the operator is repeated.

c. The transaction date and time are supplied by VIMS from a system calendar and clock. [These items may be overwritten by the operator if he chooses.]

d. The vehicle management code, make/type, reimbursable/ refundable code and one-time repair limit are accessed from the vehicle master record and entered by VIMS onto the display.

e. If the mileage or age limits have been exceeded, this condition will be displayed. If this occurs, workload control must obtain authorization from the Maintenance Control Officer to repair the vehicle.

f. The work order type (CONTRACT, OTHER GOVT AGENCY, ACCIDENT or blank for normal) is added by VIMS to the displayed work order.

g. Any scheduled maintenance jobs selected by the operator for assignment are automatically filled in by VIMS, including the system code, job description and standard hour estimate.

h. Any deferred maintenance jobs selected by the operator for assignment are also filled in by VIMS. The system code, work center, job description, estimated material cost and standard hours are supplied directly from the deferred maintenance file entry. For back-ordered parts, the bin location is shown as part of the job description.

i. For each job entered, VIMS uses an internal algorithm to convert the standard hours to an estimation of direct and indirect labor costs. These costs, together with the material costs given for each job, are accumulated and running totals are displayed by VIMS as job entries are filled in. The total estimated cost is used to determine if the one-time repair limit will be exceeded. NOTE: The costs associated with any jobs charged to operations are not included in this total.

8. The operator enters Priority, Miles/Hours, User Phone and Work Order Type (formerly the work order prefix). [When the operator enters the current mileage it will be compared internally with the

estimated mileage. If they differ by more than 500 miles, the discrepancy will be brought to the operator's attention.]

9. The operator enters jobs to be done as noted on the AFTO Form 374. For each job, he gives action code 'A', the system code, work center, job description, estimated material cost (optional), and standard hour estimate. As the jobs are entered, VIMS updates the cumulative cost estimate.

10. If a job is assigned with system code 17x, indicating brake repairs, VIMS will check to see if a safety inspection is due within 60 days or 2000 miles. If so, the safety inspection will be automatically assigned as the next job.

11. If more than five jobs are to be entered, a function key will call up a second page. The job itemization portion of the display will be overlaid with a form for jobs 5 - 10. Another function key will return the display to page 1. If any jobs are entered on page 2, the 'Page 2' indicator that follows job 5 will be marked by VIMS with an X.

12. If at any time the estimated cost of repair exceeds the one-time repair limit, a message to that effect will appear on the displayed work order. The operator completes filling out the work order and upon completion of the transaction, VIMS will enter it in the work order file and tag it as suspended awaiting approval for repair. A printed copy will be generated showing the repair limit against a breakdown of estimated repair costs. This copy will be forwarded to the proper authority for approval.

When a repair decision has been made, notification will be made to workload control, where the following dialog will ensue at the CRT:

```
          (ATTENTION KEY)
           TRANSACTION ?
          (RESUME nnnn)  Resume opening work order nnnn
[or       (CANCEL nnnn)  Cancel work order nnnn]
```

Assuming that authorization for repair was granted, RESUME will essentially pick up the Open transaction where it left off.

13. The operator may completely cancel any job on the work order by changing its action code from 'A' to 'K' (scheduled [and deferred] jobs will be returned to their respective files).

14. When all jobs have been entered, the operator signals by function key that the work order is complete and should be cut as shown. VIMS will do the following:

a. Create an entry in the open work order file.

b. Update the scheduled maintenance file if necessary.

c. Update the deferred maintenance file if necessary.

d. Access the historical maintenance data for the vehicle and check for possible repetitive maintenance. For each job just assigned, if there are any previous entries under the same major system code within the past 6 months, the maintenance history for that system code will be displayed. For example:

System Code	Sub-system Code	Date	Maintenance Action
16	1	73275	RPL
16	7	74065	FIX
16	3	74065	RPL

The operator examines the historical maintenance data and determines whether or not any repetitive maintenance may be indicated.

Wherever he feels it is necessary, he will annotate the work order to alert the shop personnel to determine the reason for the repeat maintenance.

[If the operator chooses, he may get a copy of the displayed historical maintenance data printed at the terminal printer.]

e. Print two copies of the work order. The shop copy will be printed as shown in Figure 5. The material cost and standard hours columns are replaced on the shop copy with a column for the mechanic's initials or employee number to be entered. At the bottom of the work order, space is provided for recording Quality Control inspection data. The QC data, except for the narrative remarks, will be entered into VIMS during work order close, which may

```
WORK ORDER NO (4227)  VEHICLE REG NO(69B01922)  DATE OPENED(74335)  TIME(1343)
MGT CODE(8204)  MAKE/TYPE(P-U CHE)              DATE COMPLETED(     )  TIME(    )
R/D CODE( )  MILEAGE EXCEEDED( )    AGE EXCEEDED( )
PRIORITY(Y )  MILES/HRS(067223)  USER PHONE(271-4338) WORK ORDER TYPE(F)

 ACTN  JOB SYS      WORK  JOB                                          MECHANIC
 CODE  NO. CODE OPR CTR   DESCRIPTION                                  --------
--------- ----- --- ----- ---------------------------------------- --------
(A/   )01 (361) (O) (220) (OIL CHANGE                               )
       01                 (                                        )
(A/   )02 (371) (O) (220) (OIL FILTER CHANGE                        )
       02                 (                                        )
(A/   )03 (098) (M) (230) (REPLACE WATER PUMP & THERMOSTAT          )
       03                 (                              /BIN 018) )
(A/   )04 (011) (M) (230) (REPLACE VALVES                           )
       04                 (                                        )
( /   )05 (   ) ( ) (   ) (                                        )
       05                 (                                        )
( /   )06 (   ) ( ) (   ) (                                        )
       06                 (                                        )

 ( ) CHECK IF QUALITY CONTROL INSPECTED

REJECTED
 JOB NO.  REMARKS
--------  ----------------------------------------------------------
```

Figure 5. Shop Copy of Work Order

eliminate the necessity for a separate QC inspection register.

Amend Work Order

1. When it becomes necessary to amend a work order to remove or revise a job or to add jobs that the shop may have discovered are necessary, the shop copy of the work order is brought to workload control.

2. The following dialog occurs at the CRT, where entries in parentheses are supplied by the operator:

```
(ATTENTION KEY)
 TRANSACTION ?
(AMEND)
 WORK ORDER NUMBER ?
(4227)
```

3. As during work order open, VIMS checks the scheduled and deferred maintenance indicators for the vehicle. If they are set, the scheduled and/or deferred maintenance for the vehicle is displayed and the operator is given another opportunity to select scheduled or deferred jobs for assignment.

4. The work order is then retrieved from the open work order file and displayed, with newly selected scheduled or deferred maintenance jobs, if any, added to it.

5. The cumulative cost estimates are again shown.

6. The operator adds, alters or cancels jobs, using the same general rules and procedures that pertain for work order initiation. As this is done, VIMS continues to keep the running tally of estimated repair cost.

7. When all amendment actions are completed, the operator signals this fact by function key. VIMS will do the following:

a. Update the entry for this work order in the open work order file.

b. Update the scheduled and deferred maintenance files if they were affected.

c. For any jobs that may have been added, perform a check of the historical maintenance data as was done during work order open, to reveal any possible repetitive maintenance.

d. Print updated copies of the work order (optional).

Close Work Order

1. When all work on a vehicle is completed, the shop copy of the work order will be returned to workload control for processing.

2. The following dialog occurs at the CRT, where entries in parentheses are supplied by the operator:

```
(ATTENTION KEY)
 TRANSACTION ?
(CLOSE)
 WORK ORDER NUMBER ?
(4227)
```

3. VIMS will retrieve and display the designated work order as it currently exists in the open work order file. The date and time of work order completion will be automatically filled in.

4. The operator will review the displayed jobs and, using the shop copy of the work order as reference will indicate to VIMS the disposition of each assigned job (see Figure 6).

a. Completed jobs will be given the action code 'P' to indicate they should be posted to the historical maintenance file. The secondary action code field will be filled in with a three-letter code, signifying the maintenance action taken for the job.

ADJ - adjusted
FIX - repaired
RPL - replaced
SER - serviced
OVR - overhauled

b. Jobs that must be deferred are given action code 'D', followed by a three-letter secondary action code indicating the reason for deferment.

```
WORK ORDER NO (4227)  VEHICLE REG NO(69801922)  DATE OPENED(74335)  TIME(1343)
MGT CODE(B204)  MAKE/TYPE(P-U CHE)              DATE COMPLETED(74336)  TIME(1110)
R/D CODE( )  MILEAGE EXCEEDED( )    AGE EXCEEDED( )
PRIORITY(Y )  MILES/HRS(067223)  USER PHONE(271-4338) WORK ORDER TYPE(F)

 ACTN  JOB SYS       WORK  JOB                                          MATL   STD
 CODE  NO. CODE OPR  CTR   DESCRIPTION                                  COST   HRS
-------- ----- --- ----- ---------------------------------------------- ----- ------
(P/RPL)01 (361) (O) (220) (OIL CHANGE                                  )
       01                 (                                           ) (   ) ( 0.5)
(P/RPL)02 (371) (O) (220) (OIL FILTER CHANGE                           )
       02                 (                                           ) (   ) ( 0.5)
(P/RPL)03 (098) (M) (230) (REPLACE WATER PUMP & THERMOSTAT             )
       03                 (                              /BIN 018)    ( 20) ( 4.0)
(D/DFP)04 (011) (M) (230) (REPLACE VALVES                              )
       04                 (                                           ) ( 80) (10.0)

                          REJECTED
(X)  CHECK IF QUALITY     JOB NO.      MECHANIC(S)
     CONTROL INSPECTED    --------     -----------
                            (03)       (039) (054) (    )
                            (  )       (   ) (   ) (    )
                            (  )       (   ) (   ) (    )
                            (  )       (   ) (   ) (    )
```

Figure 6. Work Order at Completion of CLOSE

PER
DFP
SKL
KIT
EQP
PRI
FND
ACC

see "ACTION CODES" at the beginning of this section for explanation of codes

VIMS will enter these jobs in the deferred maintenance file.

c. If the page 2 indicator is on, the operator will call up the next page of the work order and continue to enter the disposition of jobs.

5. Jobs which may have been written in on the shop copy of the work order but not yet added to the internal copy may be added to the display at this time. Their disposition is entered as described above.

6. After the disposition of all jobs has been entered, the operator enters Quality Control inspection data that may have been recorded on the shop copy of the work order. If the vehicle was QC inspected, the operator X's the QC field. For each job that failed to pass QC inspection, the operator will enter the job number and mechanic number. This QC data will be entered in the work order file. [R&A will be given a capability to initiate QC displays and statistical reports based on this data.] The shop copy of the work order will be forwarded to R&A; they can refer to this copy if they wish to read specific remarks by the QC inspector regarding rejected jobs.

7. Once the job disposition and QC data has been entered, the operator signals the end of the transaction through the use of a function key. VIMS will do the following:

a. Completed jobs will be posted to the historical maintenance record for the vehicle.

b. Deferred jobs will be added to the deferred maintenance file.

c. Quality control data will be added to the work order file.

d. The work order will be considered as completed, and VIMS will stop accumulating down time for the vehicle. The work

order will be internally marked as completed (but not officially closed) as of the system-supplied date and time of completion.

e. If jobs are deferred and the vehicle is returned to service, a list of deferred jobs is printed to be carried in the vehicle with the operator inspection guide. (See Figure 7).

f. The operator is given the option of obtaining a printed copy of the closed work order.

Display Status of Work Order File

1. This transaction is provided to permit the operator at workload control to display for review a summary of the status of all work orders in the active work order file.

2. The transaction is initiated as follows:

(ATTENTION KEY)
TRANSACTION ?
(WO/REVIEW)

3. VIMS will display page 1 of the work order file summary, as shown in Figure 8, and will allow the operator to use a function key to step from one page to the next, forward or backward, through the file.

4. The operator may optionally cause a printed copy of the file to be generated on the terminal printer.

5. The operator will signal the end of the transaction via function key.

VDP ON Procedure

1. This transaction is initiated by the operator at workload control when a work order is to be suspended because a vehicle has been declared VDP.

2. The following dialog occurs at the CRT, where entries in parentheses are supplied by the operator:

****** DEFERRED MAINTENANCE ******

VEHICLE REG NO: 69801922

WORK ORDER	JOB NO.	DEF CDE	SYS CDE	WRK CTR	JOB DESCRIPTION	MATL COST	STD HRS
4227	04	DFP	011	230	REPLACE VALVES	(74336)	80 10.0

Figure 7. Deferred Maintenance List to be Carried in Vehicle

**** WORK ORDER FILE SUMMARY ****

WORK ORDER	STATUS	NO. JOBS	VEHICLE REG NO.	MAKE/ TYPE	DATE/TIME RECEIVED	DATE/TIME RELEASED	W/O TYPE
4211	CLOSED 1 DAY	03	71B02417	P-U DOD	74326/0730	74326/1130	
4212	OPEN	01	64B01069	T-T IHC	74326/0735	/	
4213	CLOSED 1 DAY	05	70B03908	SED AMC	74326/0800	74326/1150	
4214	CLOSED 1 DAY	01	69B01906	P-U CHE	74326/0810	74326/1030	
4215	CLOSED 1 DAY	02	71B03978	S-W FOR	74326/0820	74326/1040	
4216	CLOSED 1 DAY	02	62B10760	DUMPSTR	74326/0830	74326/1300	
4217	OPEN	05	69D00818	LDR CAS	74326/0835	/	
4218	CLOSED 1 DAY	01	68B09928	P-U CHE	74326/0845	74326/1430	
4219	CLOSED 1 DAY	01	72C00135	DUM IHC	74326/0900	74326/1630	
4220	VDP	02	71B03552	P-U DOD	74326/0905	/	

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Figure 8. Work Order File Summary Display

```
(ATTENTION KEY)
 TRANSACTION ?
(VDP/ON)
 WORK ORDER NUMBER ?
(4364)
 DATE/TIME ON VDP ?
(74093/0930)
```

If the operator does not enter the DATE/TIME, VIMS will supply the current date and time.

3. VIMS will retrieve and display the designated work order, adding to the display the VDP status, date and time.

4. The operator will indicate the VDP jobs by changing their action code to S/VDP.

5. When the operator signals completion of the transaction, VIMS will:

a. Switch the accumulating down time for the vehicle from VDM to VDP.

b. Enter all VDP jobs in the deferred maintenance file.

c. Place the work order in open-suspended status.

VDP OFF Procedure

1. This transaction is initiated by the operator at workload control when he wishes to reactivate a suspended work order and remove the vehicle from VDP status.

2. The following dialog occurs at the CRT where entries in parentheses are supplied by the operator:

```
(ATTENTION KEY)
 TRANSACTION ?
(VDP/OFF)
 WORK ORDER NUMBER ?
(4364)
 DATE/TIME OFF VDP ?
(74096/1345)
```

As in VDP ON, if the operator does not enter a date and time, the current date and time will be supplied by VIMS.

3. VIMS will retrieve and display the work order.

4. The action code for any VDP jobs will be changed from 'S/VDP' to 'A', and the jobs will be removed from the deferred maintenance file.

5. VIMS will switch the accumulating down time for the vehicle from VDP to VDM.

6. Once the work order has been returned to open-active status, the operator may enter additional jobs as during work order amendment.

Add Job to Deferred Maintenance File

1. This transaction is provided to allow workload control to add jobs to the deferred maintenance file directly, without operating through a work order-related transaction. It is intended specifically for the case where deferred maintenance for a vehicle is to be recorded although the vehicle was not accepted into the shop, and hence had no work order opened against it.

2. The dialog at the CRT for this transaction is:

(ATTENTION KEY)
TRANSACTION ?
(DEFER/ADD)
VEHICLE ?
(65C01819)

3. VIMS will display a form as shown in Figure 9. The deferred maintenance file will be searched, and any jobs that are deferred for this vehicle will be displayed.

4. VIMS begins a new entry by supplying the date and assigning a dummy work order number (XXXX) and a job number. The operator completes the entry according to the format in Figure 9. As each entry is completed, VIMS will begin the next, inserting work order number XXXX and assigning the next sequential job number.

5. When all jobs have been added, the operator terminates the transaction with a function key.

6. VIMS adds the job(s) to the deferred maintenance file and sets the deferred maintenance indicator in the vehicle master record. If any added jobs are given a deferral code of DFP (deferred for parts), a message to materiel control is printed,

```
                    **** DEFERRED MAINTENANCE ****

                    VEHICLE REG NO: 65C01819

                                                                    MATL  STD
      WORK  JOB  DEF  SYS      WRK                                  COST  HRS
DATE  ORDR  NO.  CDE  CDE  O/M  CTR  JOB DESCRIPTION                ----  ----
----- ----  ---  ---  ---  ---  ---  ------------------------------
74336 XXXX  01
```


Figure 9. Displayed Form for DEFER/ADD

identifying the new deferred jobs requiring parts (see Figure 10). A printed copy of all deferred jobs for this vehicle is also prepared, to be carried in the vehicle.

Change Job in Deferred Maintenance File

1. This transaction is provided to allow workload control to make changes or corrections to entries in the deferred maintenance file.

2. The dialog at the CRT for this transaction is:

```
(ATTENTION KEY)
 TRANSACTION ?
(DEFER/CHANGE)
 VEHICLE ?
(69B01922)
```

3. VIMS displays all deferred jobs for the specified vehicle, using the format of Figure 3.

4. The operator enters a 'C' under SEL IND for each entry to be changed, and then alters items in the entry as necessary.

5. When all changes have been entered, the transaction is terminated by function key and VIMS makes the indicated changes to the file.

Delete Job from Deferred Maintenance File

1. This transaction is provided to allow workload control to remove jobs from the deferred maintenance file.

2. The dialog at the CRT for this transaction is:

```
(ATTENTION KEY)
 TRANSACTION ?
(DEFER/DELETE)
 VEHICLE ?
(69B01922)
```

3. VIMS displays all deferred jobs for the specified vehicle, using the format of Figure 3.

4. The operator enters a 'D' under SEL IND for each entry to be deleted.

**** NEW DEFERRED JOBS REQUIRING PARTS ****

MESSAGE NUMBER: 001
DATE : 74336
TIME : 1115
FROM : WORKLOAD CONTROL
TO : MATERIEL CONTROL

VEHICLE REG NO: 65C01819

WORK ORDER	JOB NO.	DEF CDE	SYS CDE	WRK CTR	JOB DESCRIPTION		MATL COST	STD HRS
XXXX	01	DFP	084	230	REPLACE MUFFLER	(74336)	35	1.5

Figure 10. Parts Request Generated by DEFER/ADD

5. When all deletions have been indicated, the transaction is terminated by function key.

6. VIMS deletes the designated jobs from the deferred maintenance file. If all deferred jobs for the vehicle have been deleted, the deferred maintenance indicator in the vehicle master record is turned off.

[TCTO Procedure]

1. When workload control receives a TCTO order it will be time/date stamped, and the operator at workload control will initiate the following VIMS transaction at the CRT:

```
(ATTENTION KEY)
 TRANSACTION ?
(TCTO)
 TCTO NUMBER ?
(nn---n)
 COMPLIANCE TIME ?
(30 DAYS)
```

2. VIMS will display a form as shown in Figure 11.

3. The operator will enter the FSN, Management Code and year for the affected vehicles from the TCTO, and VIMS will scan the vehicle master file to determine if the TCTO applies to any vehicles in the fleet. If so, their vehicle registration numbers will be displayed. The operator may alternatively enter the vehicle registration numbers directly if they are known. NOTE: Other search keys may be required, to determine if the TCTO applies to any vehicles in the fleet.

4. Assuming the TCTO does apply, VIMS will display a form as shown in Figure 12, which, when completed, represents the entry to be made in the deferred maintenance file for each affected vehicle.

5. The operator completes the TCTO deferred job entry, and VIMS adds it to the deferred maintenance file for each vehicle to which the TCTO pertains.

6. VIMS prints two copies of the transaction, showing the vehicles to which the TCTO applies. One copy will be used by workload control in scheduling vehicles into the shop. The other copy will be forwarded to materiel control to serve as a parts request if the TCTO requires parts (as TCTO parts or kits are prepared or received, materiel control will enter their bin

TCTO NO. nnn ------ n

VEHICLE REG. NO.	FEDERAL STOCK NUMBER	MGT CODE	YEAR

Figure 11. Form for Entry of TCTO Search Data

**** TCTO DEFERRED JOB ****

DATE	WORK ORDR	JOB NO.	SYS CDE	O/M	DEF CDE	WRK CTR	JOB DESCRIPTION	MATL COST	STD HRS
74Ø93	TCTO	Ø1			TCO		TCTO NO. nnn------n (3Ø DAYS)	ØØØ	
		Ø1							

Figure 12. TCTO Deferred Job Entry Form

locations in the deferred file entries, using the DEFER/CHANGE transaction).

TRANSACTIONS - MATERIEL CONTROL

Review Back-Ordered Parts Status

1. This transaction allows materiel control to display and page through the Back-Ordered Parts file (BOPF) in order to review the status of any items in the file.

2. The transaction is initiated as follows:

```
(ATTENTION KEY)
 TRANSACTION ?
(PARTS/REVIEW)
```

3. VIMS will display page 1 of the BOPF, and will allow the operator to use a function key to step from one page to the next, forward or backward, through the file. Items will be displayed as in Figure 13. [The operator may optionally cause a printed copy of the file to be generated on the terminal printer.]

4. The operator will signal the end of the transaction via function key.

Add Item to Back-Ordered Parts File

1. This transaction will allow materiel control to add new items to the BOPF.

2. The transaction is inititated as follows:

```
(ATTENTION KEY)
 TRANSACTION ?
(PARTS/ADD)
 VEHICLE ?
(69BO1922)
```

3. VIMS will retrieve and display all entries in the BOPF (if any) for the specified vehicle.

4. VIMS will start a new entry by filling in the Vehicle Registration Number. The operator will complete the entry according to the format shown in Figure 14. As each entry is completed, VIMS will begin the next by inserting the Vehicle Registration Number.

5. When all additions for the specified vehicle have been entered, the operator terminates the transaction via function key, and VIMS updates the BOPF.

BACK ORDERED PARTS

C C *	VEHICLE REG NO.	WORK ORDR	JOB NO.	PART NO.(FSN)NOMENCLATURE	QTY	UNIT COST	M O	SC CD	DATE ORDER	DUE/ RCVD	BIN LOC
	69C00085	XXXX	01	1925103/HEATER CORE	1	33.70	M	C	74301		
	69C00085	4225	02	697-67919/PRINTED CIR BD	1	9.76	M	C	74326		
	69B01922	3897	03	WATER PUMP-69 CHEV PICKUP	1	18.98	M	C	74301	74315	018
	69B01922	4227	04	ENG-VALVES&TAPPETS CHE-PU	8	10.00	M	C	74335	74336	
	66B02546	3990	01	2610004897973/G78-15 TIRE	1	18.68	O	S	74312	74321	TIR
	68D01600	3458	07	WIPER MOTOR- OSH SNO-PLOW	1	42.50	M	C	74239		

Figure 13. Page of Back-Ordered Parts File as Displayed by PARTS/REVIEW

BACK ORDERED PARTS

VEHICLE REG NO.	WORK ORDR	JOB NO.	PART NO.(FSN)	NOMENCLATURE	QTY	UNIT COST	M O	SC CD	DATE ORDER	DUE/ RCVD	BIN LOC
69B01922	3897	03	WATER PUMP-69 CHEV PICKUP		1	18.98	M	C	74301	74315	018
69B01922											

Figure 14. Displayed Form for PARTS/ADD

Change Item in Back-Ordered Parts File

1. This transaction will allow materiel control to change or update an existing entry in the BOPF (e.g. report availability and bin location of received part).

2. The transaction is initiated as follows:

```
(ATTENTION KEY)
 TRANSACTION ?
(PARTS/CHANGE)
 VEHICLE, A(ALL), OR X(EXIT)
```

3. The operator is given three options:

a. If he knows the vehicle for which the parts were ordered (he can determine this from a printout of the BOPF), he simply enters the Vehicle Registration Number. VIMS will locate and display all back-ordered parts for the designated vehicle, as shown in Figure 15.

b. If the operator enters an 'A', VIMS will display page 1 of BOPF and the operator will be allowed to page through the file as in PARTS/REVIEW until he locates the entries to be changed.

c. If the operator enters an 'X', VIMS will exit from the transaction.

4. Once the operator locates an entry to be changed, he steps the cursor to the beginning of that entry, and enters a 'C' preceding the Vehicle Registration Number. He then makes whatever changes or additions to the line that are necessary.

5. The process is repeated for each entry to be changed.

6. When all changes have been entered, the operator terminates the transaction via function key.

7. VIMS will update the BOPF to reflect the changes entered. If the transaction reported the receipt of parts already on order, VIMS will check to see if all parts for the specific job are now on hand. If they are, the corresponding entry in the deferred maintenance file will be internally updated to show the bin location of the parts.

BACK ORDERED PARTS

C C	VEHICLE REG NO.	WORK ORDR	JOB NO.	PART NO.(FSN)	NOMENCLATURE	QTY	UNIT COST	M O	SC CD	DATE ORDER	DUE/ RCVD	BIN LOC
	69B01922	3897	03	WATER PUMP-69 CHEV PICKUP		1	18.98	M	C	74301	74315	018
	69B01922	4227	04	ENG-VALVES&TAPPETS CHE-PU		8	10.00	M	C	74335	74336	

Figure 15. Display for PARTS/CHANGE or PARTS/DELETE

8. In the latter case, a PARTS ARRIVAL NOTIFICATION (see Figure 16) will be printed at workload control, indicating the fact that a deferred job may now be done. Special attention will be drawn to VDP jobs for which parts are now available.

Delete Item from Back-Ordered Parts File

1. This transaction will allow materiel control to remove items from the BOPF.

2. The transaction is initiated as follows:

```
(ATTENTION KEY)
 TRANSACTION ?
(PARTS/DELETE)
 VEHICLE, A(ALL) OR X(EXIT)
```

3. The operator is given three options:

a. If he knows the vehicle for which the parts were ordered he simply enters the Vehicle Registration Number. VIMS will locate and display all back-ordered parts for the designated vehicle, as shown in Figure 15.

b. If the operator enters an 'A', VIMS will display page 1 of BOPF and the operator will be allowed to page through the file as in PARTS/REVIEW until he locates the entries to be deleted.

c. If the operator enters an 'X', VIMS will exit from the transaction.

4. Once the operator locates an entry to be deleted, he steps the cursor to the beginning of that entry and enters a 'D'.

5. When all deletions have been indicated, the operator will terminate the transaction via function key, and VIMS will delete the indicated items from the BOPF.

Report Issue of Back-Ordered Parts

1. This transaction will be initiated by materiel control when a back-ordered part is finally issued against a work order for installation on a vehicle. The part will usually, but not necessarily, be issued to the vehicle for which it was ordered. The purpose of this transaction is to remove the part from the BOPF, and to charge the cost of the part to the proper vehicle. The cost of

**** PARTS ARRIVAL NOTIFICATION ****

MESSAGE NUMBER:003
DATE :74335
TIME :1407
FROM :MATERIEL CONTROL
TO :WORKLOAD CONTROL

VDP	VEHICLE REG. NO.	WORK ORDR	JOB NO.	PART NO. (FSN)/NOMENCLATURE	QTY	DATE ORDER	BIN LOC
	64D00281	4210	02	CH-57/MUFFLER	1	74335	014
	64D00281	4210	02	X-187/CLAMP	1	74335	014
	64D00281	4210	02	X-200/CLAMP	1	74335	014
	64D00281	4210	02	TX-20/HANGER	1	74335	014

Figure 16. Parts Arrival Notification

all back-ordered parts is carried temporarily in account H8888 until it can be applied to a specific vehicle.

2. The transaction is inititated as follows:

```
(ATTENTION KEY)
 TRANSACTION ?
(PARTS/ISSUE)
 WORK ORDER NO. ISSUED AGAINST ?
(4227)
```

3. VIMS will display page 1 of the BOPF, and will allow the operator to use a function key to step from one page to the next through the file.

4. The operator will locate the issued part(s) on the CRT and will check them off by entering an 'X' at the beginning of each line entry (See Figure 17).

5. When all parts issued against the specified work order have been X'd, the operator will signal completion via function key.

6. VIMS will

a. [Subtract the cost of the specified part(s) from account H8888 and charge it to the designated work order.]

b. [When adding the charge to the work order record, check to see if the vehicle to which the part was issued is the vehicle for which it was ordered. If not, check the deferred maintenance file and make sure that the original job for which the part was ordered no longer shows the part as available.]

c. Remove the issued part(s) from the BOPF.

Review High Cost Bench Stock Master File

1. This transaction will allow an operator in materiel control to review the contents of the HCBS master file.

2. The transaction is initiated by the operator at the CRT as follows:

```
(ATTENTION KEY)
 TRANSACTION ?
(HCBS/REVIEW)
```

WORK ORDER ISSUED AGAINST: 4227
BACK ORDERED PARTS

C C	VEHICLE REG NO.	WORK ORDR	JOB NO.	PART NO.(FSN)NOMENCLATURE	QTY	UNIT COST	M O	SC CD	DATE ORDER	DUE/ RCVD	BIN LOC
	69C00085	XXXX	01	1925103/HEATER CORE	1	33.70	M	C	74301		
	69C00085	4225	02	697-67919/PRINTED CIR BD	1	9.76	M	C	74326		
X	69B01922	3897	03	WATER PUMP-69 CHEV PICKUP	1	18.98	M	C	74301	74315	018
	69B01922	4227	04	ENG-VALVES&TAPPETS CHE-PU	8	10.00	M	C	74335	74336	
	66B02546	3990	01	2610004897973/G78-15 TIRE	1	18.68	O	S	74312	74321	TIR
	68D01600	3458	07	WIPER MOTOR- OSH SNO-PLOW	1	42.50	M	C	74239		

Figure 17. Display During PARTS/ISSUE

3. VIMS will display page 1 of the HCBS master file in the format of Figure 18 and will allow the operator to use a function key to step from one page to the next, forward or backward, through the file. [The operator will be permitted optionally tc obtain a printed copy of the file on the terminal printer.]

4. The operator will signal the completion of the transaction via function key.

Add Item to High Cost Bench Stock Master File

1. This transaction takes the place of the E transaction in the present system, and will be used by an operator in materiel control for adding new items to the HCBS master file.

2. The transaction will be initiated by an operator at the CRT as follows:

(ATTENTION KEY)
TRANSACTION ?
(HCBS/ADD)

3. VIMS will present a form on the CRT in the format shown in Figure 19. The operator will enter one or more items on the form, supplying FSN, price, EEIC code, charge code and description for each. The operator also specifies how many Q cards are to be generated for each new stock item. VIMS will assign a 3-digit item number to each added item.

4. After the operator has completed making entries, he signals the completion of the transaction via function key. VIMS will:

a. Update the HCBS master file.

b. [Cause the requested number of Q cards to be generated, to be delivered to materiel control.]

Change High Cost Bench Stock Master File Entry

1. This transaction will allow an operator in materiel control to make changes to existing items in the HCBS master file.

2. The transaction is initiated by the operator at the CRT as follows:

*** HIGH COST BENCH STOCK FILE ***

ITEM NO.	FSN	UNIT PRICE	EEIC	CHG CODE	DESCRIPTION
001	2610L0378192835	40.28	609	0	TRAMB9.15X15 REG4PTL
002	2610L0383622835	20.59	609	0	TRTRA7.50X16 RIB6PTT
003	2610L0408022835	42.00	609	0	TRAMB 8.90X15 MS8PTL
004	2610001776877	25.23	609	0	TRTRK800-16.56 PRGTL
005	2610001776881	33.11	609	0	TRTRK800X16.5 MS6PTL
006	2610001777249	16.50	609	0	TRPAS F78-14B4 REGTL
007	2610001777250	15.70	609	0	TRPAS F78-14 4PMSTL
008	2610001777253	37.40	609	0	TRPAS H78-14 4PREGTL
009	2610001777254	36.00	609	0	TRPAS H78-14 MS4PTL
010	2610001777255	18.93	609	0	TRREG TREAD 4PH7815
011	2610001777256	26.00	609	0	TRPAS H78X15 MS4PTL
012	2610002043939	46.57	609	0	TRTB825-2010PN REGTT
013	2610002697383	7.00	609	0	TUBE 900-20TR175APCC
014	2610003509970	52.26	609	0	TRTB 750-20 8P RGTT
015	2610004736705-2	18.87	609	0	TRPAS G78-15 4PMSTL
016	2610004736800	40.00	609	0	TRPAS 915X15 REG8PTL
017	2610004897917	10.46	609	0	TRPAS 845-15 8P RGTL
018	2610004897957	14.12	609	0	TRPAS F78-14 4PREGTL
019	2610004897961	15.77	609	0	TRPAS H78-14 4PREGTL
020	2610004897973	18.68	609	0	TRPAS G78-15 4PREGTL
021	2610004897975	34.28	609	0	TRPAS H78X15 REG4PTL

Figure 18. Page 1 of High Cost Bench Stock File as Displayed by HCBS/REVIEW

Figure 19. Displayed Form for Adding Item to HCBS File

(ATTENTION KEY)
TRANSACTION ?
(HCBS/CHANGE)
ITEM NUMBER ?
(043)

3. VIMS will locate the requested item in the HCBS file and will display it in the format shown in Figure 20.

4. The operator will make any desired changes to the displayed entry.

5. When changes are complete, the operator signals this fact to VIMS, and VIMS will return the corrected entry to the HCBS file.

Delete High Cost Bench Stock Master File Entry

1. This transaction will allow an operator in materiel control to remove entries from the HCBS master file.

2. The transaction will be initiated by the operator at the CRT as follows:

(ATTENTION KEY)
TRANSACTION ?
(HCBS/DELETE)
ITEM NUMBER ?
(013)

3. VIMS will locate the specified item and remove it from the HCBS file.

Issue High Cost Bench Stock Item

1. This transaction will be used by an operator in materiel control to cause VIMS to charge a HCBS item to the work order against which it was issued.

2. When a HCBS part is issued, the issuing agent completes a Q card for that item giving the date, quantity issued and work order number. If he wishes to replenish his stock of Q cards for this item, he also enters a replenishment quantity.

3. Completed Q cards will be delivered to materiel control, where an operator at the CRT will initiate a transaction as follows:

*** HIGH COST BENCH STOCK FILE ***

ITEM NO.	FSN	UNIT PRICE	EEIC	CHG CODE	DESCRIPTION
043	26100519454	11.04	609	0	INNERTUBE,PNEUMATIC

Figure 20. Item Displayed for HCBS/CHANGE

(ATTENTION KEY)
TRANSACTION ?
(HCBS/ISSUE)

4. VIMS will display a form as shown in Figure 21.

5. The operator will fill in the form, one item per line. When all issued items have been entered, the operator will signal completion of the transaction via function key.

6. For each entry, VIMS will:

a. [Use the item number to locate the HCBS master file record for the part and obtain the FSN, the unit cost and charge code.]

b. [Use the data retrieved from the HCBS record together with data from the ISSUE transaction to make an entry in the designated work order record that charges the cost of the HCBS part(s) to the proper work order.]

c. [Subtract the corresponding cost from account H8888, to which all HCBS parts are charged until issued.]

d. [Cause the requested number of Q cards to be generated for subsequent delivery to materiel control if replenishment is indicated on an ISSUE entry.]

[VDP Summary Display]

1. This transaction when initiated will result in a CRT display showing the status of parts for all vehicles that are currently VDP. The display, which is a composite of items from the deferred maintenance file and the back-ordered parts file, is intended to replace the VDP status board in materiel control.

2. The transaction is initiated as follows:

(ATTENTION KEY)
TRANSACTION ?
(VDP/DISPLAY)

3. VIMS searches the deferred maintenance file, locating all VDP jobs and noting the time and date that VDP was declared.

4. The corresponding entry is located in the back-ordered parts file, from which VIMS obtains information on parts status.

**** HIGH COST BENCH STOCK ISSUE ****

WORK ORDER NUMBER	ITEM NUMBER	QUANTITY ISSUED	DATE ISSUED	REPLENISHMENT QUANTITY
••••	•••	••	•••••	••

Figure 21. Displayed Form for HCBS/ISSUE

5. A display is generated, using the format shown in Figure 22.

6. If the operator desires, he may cause a copy of the VDP Summary Display to be printed on the terminal printer.

Input COPARS Cost Data

1. This transaction will be used by an operator in materiel control to enter cost data into VIMS for parts issued from COPARS. The same transaction will be used to help the operator keep track of parts warranty information.

2. The transaction will be initiated at the CRT as follows:

```
(ATTENTION KEY)
 TRANSACTION ?
(COPARS)
 DATE ?
(74335)
 WORK ORDER NUMBER ?
(4217)
```

3. VIMS will determine which vehicle is represented by the designated work order, and will scan a parts warranty file to determine if there are any part warranties still in effect for this vehicle. If there are, they will be displayed as shown in Figure 23. The operator can then check the sales slip against the display to see if a part under warranty is being replaced.

4. After the operator has reviewed the warranty display (if any), he signals PROCEED with a function key, and VIMS displays a form as shown in Figure 24 for sales slip data input (if no warranty data was found for this vehicle, the sales slip input form will be displayed automatically).

5. For each entry on the sales slip the operator will input the part number, quantity, unit list price and the percentage discount to be applied. VIMS will compute and display the cost for each entry (discounted unit cost times quantity).

6. If the part was received in fulfillment of a back order, the BOP indicator is X'd.

7. If the part carried a special warranty, the warranty indicator is X'd and the duration of the warranty in days and miles is entered.

**** VDP SUMMARY ****

VEHICLE REG NO.	WORK ORDR	JOB NO.	TIME/DATE ON VDP	PART NO. (FSN)/NOMENCLATURE	QTY	SC	DATE DUE	RCVD
67BØØ243	4364	Ø9	1535/74Ø93	287254C91-IHC/LEAF SPRING	Ø1	S	74Ø96	NO

.
.
.

Figure 22. VDP Summary Display

****PARTS WARRANTY****

VEHICLE REG NO.:69D00818

PART NO.	PART DESCRIPTION	PART INSTALLED (DATE) (MILES)	WARRANTY PERIOD (DAYS) (MILES)
	MANIFOLD	74245	090
	EXHAUST PIPE	74245	090

Figure 23. Parts Warranty Display

**** COPARS SALES SLIP ENTRY ****

WORK ORDER NO: 4217
DATE: 74335

PART NO.	QTY	LIST (EACH)	DISC PCNT	BOP IND	WNTY IND	DAYS WNTY	MILES WNTY	PART DESCRIPTION	COST
CH-4ØØ	Ø1	3.7Ø	21					CAP	2.92
CH-3Ø3	Ø1	1.Ø5	21					ROTOR	.83
CH-41XU	Ø1	2.95	21					POINTS	2.33
AL-111X	Ø1	1.65	21					CONDENSER	1.30
45-XLS	Ø8	1.35	21					AC PLUGS	8.56
3981414Ø	Ø1	7.35	21	X				MIRROR	5.82
									21.76

Figure 24. COPARS Sales Slip Data Entry Form

8. The part description is entered. This entry is optional except for parts under warranty.

9. The operator will signal when the last part has been entered, at which time VIMS will:

a. Compute and display a total cost for the sales slip.

b. [Update the work order file with cost data for all installed parts.]

c. [Charge the cost of back-ordered parts received to account H8888 (when they are subsequently issued to a specific vehicle, the cost will be transferred from account H8888 to the vehicle.)]

d. Log the transaction onto a file that will be later passed to Accounting & Finance.

e. For each part that carried a special warranty, make an entry in the parts warranty file. Entries will include:

Vehicle Registration Number
Part Number
Part Description
Date Installed
Mileage When Installed
Warranty Period
Warranty Miles

TRANSACTIONS - REPORTS AND ANALYSIS (R&A)

[Update Scheduled Maintenance]

1. This transaction allows R&A to update the scheduled maintenance data for a vehicle when such maintenance is reported on AF Form 15 or SF Form 149. This replaces the use of N cards for reporting scheduled maintenance when no work order has been opened.

2. The transaction is initiated as follows:

```
(ATTENTION KEY)
 TRANSACTION ?
(SCHED/UPDATE)
 VEHICLE ?
(67B00243)
```

3. VIMS will present a form on the CRT as shown in Figure 25.

4. The operator will fill in the form and signal completion via function key.

5. VIMS will update the vehicle master record for the designated vehicle.

[Update Historical Repair File]

1. This transaction will allow R&A to enter into the vehicle historical repair file a record of any maintenance performed on a vehicle that was not reported on a work order (e.g., emergency road repairs).

2. The operator will initiate the transaction as follows:

```
(ATTENTION KEY)
 TRANSACTION ?
(HIST/UPDATE)
 VEHICLE ?
(67B00243)
```

3. VIMS will display a form as shown in Figure 26.

4. The operator will enter the maintenance history data, making one entry for each system/subsystem repaired. The "Maintenance Action" entry will be one of the following:

**** SCHEDULED MAINTENANCE UPDATE ****

VEHICLE REG. NO.	MILES/ HOURS	REL DATE	LUBR	OIL CHNG	OIL FLTR	SPEC INSP	SFTY INSP	VDM	VDP	ACC	CON	OGA
67BØ6193	Ø72183	74Ø79	X	X	X			ØØ2				

Figure 25. Scheduled Maintenance Update Form

**** UPDATE VEHICLE HISTORICAL REPAIR FILE ****

VEHICLE REG. NO.: 67BØØ243

SYSTEM CODE	SUB-SYSTEM CODE	DATE	MAINTENANCE ACTION
Ø3	7	74Ø89	RPL

Figure 26. Historical Maintenance Update Form

ADJ - adjusted
FIX - repaired
RPL - replaced
SER - serviced
OVR - overhauled/rebuilt

5. When all data has been entered, the operator will terminate the transaction and VIMS will add the new data to the historical repair file for the designated vehicle.

[Update Parts Warranty File]

1. This transaction will allow an operator in R&A to record any special warranties for parts installed on a vehicle but not reported in the usual way (e.g. repairs reported on AF Form 15 or SF Form 149).

2. The transaction will be initiated at the CRT as follows:

(ATTENTION KEY)
TRANSACTION ?
(WARRANTY/UPDATE)
VEHICLE ?
(69D00818)

3. VIMS will scan the parts warranty file and will display any warranties currently in effect for the designated vehicle. These will be presented on the display in the format of Figure 23.

4. The operator will enter the data necessary to define the new warranty.

5. When all data has been entered, the operator will terminate the transaction and VIMS will add the new item to the parts warranty file.

Fuel/Oil Issue Transaction

1. This transaction will be used by R&A to report fuel and oil issue data to VIMS. Sources for this data will be copies of AF Form 1251 initiated daily by the base service station, and all fuel and oil sales as reported on AF Form 15 and SF Form 149.

2. Normal mode will be to input fuel/oil issue data in a batch. This batch input corresponds to the preparation and submission of M cards in the present system.

3. The operator will initiate the transaction as follows:

(ATTENTION KEY)
TRANSACTION ?
(FUEL)

4. VIMS will display a form as shown in Figure 27.

5. The operator will enter data on the displayed form as illustrated. As each line is completed it will be validity checked. Any errors will be noted at the end of the line entry. The following error messages may appear:

a. UNRECOGNIZED VEHICLE. The Vehicle Registration Number does not correspond to any in the fleet.

b. INVALID FUEL ENTRY. This message is given whenever a fuel quantity greater than 30 gallons is entered.

c. INVALID OIL ENTRY. This message is given whenever an oil quantity greater than 2 quarts is entered.

d. INVALID DATE. The date entered is greater than today's date.

6. If an entry contains an error, the operator has three immediate options:

a. Correct the entry.

b. Cancel the entry (set aside the source document for resolution and later entry).

c. Ignore (override) the error and proceed.

7. When the screen is filled, VIMS will save the data and clear the screen for additional entries.

8. When all data has been entered the operator signals via function key [and VIMS uses the data to update the vehicle master file.]

Manhour Reporting

1. This transaction will be initiated by an operator in R&A in order to enter into VIMS the data from employee labor time cards. Time cards will be completed daily by each employee and delivered to

**** FUEL/OIL ISSUE ****

ISSUING ORG	VEHICLE REG. NO.	FUEL (GAL)	OIL (QT)	DATE	
OM	68BØ9355	18.5		74325	
OM	71BØ1762	15.Ø		74325	
OM	73BØ2745	11.6		74325	
OM	67BØ33Ø6	36.8		74325	INVALID FUEL ENTRY
OM	67BØ6193	13.4		74325	
OM	67BØ6193		1	74325	
OM	67BØ6193	19.1		74326	
OM	69BØ1922		3	74325	INVALID OIL ENTRY

Figure 27. Displayed Form for Fuel/Oil Issue Data Entry

R&A, where they will normally be entered into VIMS in batches by work center.

2. The transaction will be initiated as follows:

```
     (ATTENTION KEY)
      TRANSACTION ?
     (TIME/INPUT)
      WORK CENTER, SSAN, OR X(EXIT)
     (17220)       batch input for work center
or   (036366930)   separate input for one employee
```

3. If the operator wishes to enter the data for a single employee, he gives the employee's SSAN. VIMS will obtain the name and assigned work center and will display these together with the SSAN on an input form as shown in Figure 28. The operator enters data from the time card and signals via function key when he is done. VIMS will accept the data, and will again prompt with

```
WORK CENTER, SSAN, OR X(EXIT)
```

4. If the operator wishes to enter data in a batch for a work center, he gives a work center number. VIMS will then present, one at a time, the names of all employees assigned to that work center. The names will be obtained from the employee master file in alphabetic order, and will be presented as follows:

```
NEXT EMPLOYEE IS ASHER N K
N(NEXT) S(SKIP) P(PREVIOUS) X(EXIT)
```

The operator has the following options:

a. If the operator has a time card matching the name shown, he enters 'N' for NEXT and a form for data input (see Figure 28) will be displayed. The operator enters the data from the time card and signals via function key when he is done. VIMS will accept the data for the employee, and will prompt by showing the next name from the work center:

```
NEXT EMPLOYEE IS BACON H P
N(NEXT) S(SKIP) P(PREVIOUS) X(EXIT)
```

b. If the operator has no data for the employee shown, he enters 'S' meaning SKIP, and VIMS will prompt by showing the next name alphabetically from the work center list.

EMPLOYEE NAME:METZGER E H
SSAN:021436096
WORK CENTER:17200

DATE	WORK ORDER NUMBER	JOB NUMBER OR LABOR CODE	WORK SHIFT CODE	TIME (HOURS)
74335	4211	01	1	01.2
74335	4211	02	1	00.8
74335	4212	03	1	02.0
74335	4212	04	1	01.3
74335	4217	02	1	00.5
74335	9999	54	1	01.0

Figure 28. Displayed Form for TIME/INPUT

c. If the operator wishes to enter a card out of sequence he enters 'P', and VIMS asks for the employee's SSAN. The operator enters the SSAN and VIMS displays an input form with the employee's name, SSAN and assigned work center filled in. The operator enters the data for the employee and signals via function key when he is done. VIMS accepts the data, and returns to the alphabetic sequence temporarily broken, prompting with the next name from the work center list.

d. The operator may terminate the prompting by name for a work center by entering 'X' for EXIT. VIMS will assume that he has no more data for the work center, and will allow him to select another work center, prompting with

WORK CENTER, SSAN, OR X(EXIT)

NOTE: This will happen automatically after all employees from a work center have been processed.

5. When no more data is to be entered, the operator responds to the prompt

WORK CENTER, SSAN, OR X(EXIT)

with an 'X'.

6. VIMS will perform a number of validity checks on the data. A check is made to see if 8 hours of prime shift time have been reported by each employee, and to verify that all work order numbers and job numbers reported are legitimate. If no errors are found, an employee's time is accepted as reported.

7. For those records that fail the validity checking, VIMS will create an error suspense file and will print an error listing (see Figure 29) showing the data as it was reported and flagging all detected errors.

8. After determining what corrections are necessary, the operator will accomplish them using the TIME/EDIT transaction.

Error Correction for Manhour Reporting

1. During the TIME/INPUT transaction, any time card entries that fail the validity checking are saved on an Error Suspense File (ESF). The operator is provided with a printout of the ESF, showing

ERROR SUSPENSE FILE

ENT NO.	EMPLOYEE NAME	SSAN	WKCTR	DATE	WORK ORDER	JOB NO.	SHIFT CODE	TIME (HOURS)
001	BACON H P	468816755	17220	74335	4196	01	1	1.0
				74335	4209	01	1	1.0
				74335	9998	00	1	3.0
				74335		54	1	*4.0
002	RAWDING R C	348233310	17220	74335	*4302	*01	1	2.5
				74335	4200	01	1	0.5
				74335	4199	01	1	0.5
				74335	4199	02	1	0.5
				74335	4199	03	1	0.5
				74335	9999	00	1	3.5
003	CAMPANELLI A	493021773	17230	74335	4201	01	1	1.0
				74335	4201	02	1	2.5
				74335	4201	03	1	0.5
				74335	4207	*07	1	4.0

Figure 29. Error Suspense File Generated from TIME/INPUT

the data as reported and with all detected errors flagged. Each entry on the ESF is assigned an entry number (see Figure 29).

2. The operator determines the corrections to be made, and initiates the error-correction transaction as follows:

```
(ATTENTION KEY)
 TRANSACTION ?
(TIME/EDIT)
 ENTRY OR X(EXIT)
(001)
```

3. As shown above, the operator gives the number of the entry he wishes to correct. VIMS retrieves the entry from the ESF and displays it in the same format used for TIME/INPUT.

4. The operator makes any desired corrections and signals completion via function key.

5. The entry is immediately checked for errors. If none are found, the entry is accepted and the message

ENTRY IS NOW CORRECT

will appear. If the entry still contains errors, the newest version will replace the previous version on the ESF (same entry number) and the operator will be informed

ENTRY IS STILL INCORRECT

In either case, VIMS will again prompt with

ENTRY OR X(EXIT)

6. The operator continues to make corrections to whatever entries he may choose. When he is done, he terminates the transaction by entering 'X'. If any entries remain uncorrected, the ESF will be preserved, and the operator will be given an option to print a new copy of the ESF.

SECTION V

COMMENTS DURING TESTING (SUMMARIZED AND ANNOTATED)

DISCUSSION

The material in this section represents a summarization and categorization of comments that were recorded during testing. A total of almost 400 comments were recorded by the two observers. The comments were numbered, sorted and categorized, primarily by the transaction to which they pertained. They were further sorted by sub-category within transaction. A separate category was created for comments regarding the CRT keyboard, for requests and suggestions regarding special reports and inquiries, and, of course, the inevitable General category for those comments that didn't fit anywhere else.

After sorting, comments were combined and summarized. Many of the comments were repeats, either because both observers had recorded the same comment, or because different subjects or teams said essentially the same thing. Where necessary, comments were annotated to further clarify or illustrate the intent. Due to the lack of time and the volume of feedback, there has not been an opportunity to examine or analyze the comments in any depth.

Given the transactional descriptions in Section IV as a baseline, the comments should provide strong guidance to subsequent iterations of transactional specifications. It is urged, however, that this not be done too precipitously. The comments reveal that there are some major changes to be considered, and these should be addressed and thought out carefully. Major modifications should be validated if possible by discussion with functional personnel. This is especially true in the materiel control area.

COMMENTS

1. OPEN

a. Repetitive Maintenance

1. Six months seems a reasonable cut-off point for keeping repair history for repeat maintenance checking.

2. The repeat maintenance file entry should include the mileage at which each maintenance action was taken.

3. "I think the expanded system codes will be sufficient to identify repeat maintenance."

4. "When making job changes to the work order we will not forget to look at repeat maintenance - it will always be there automatically."

5. There are two criteria to be considered in repeat maintenance.

(1) For major components we must talk about periods of up to a year

(2) On minor components we only look for 90-180 days.

6. Could repeat maintenance and warranty be tied together?

7. The repeat maintenance display should be titled, more self-explanatory, and should print out somewhere rather than requiring the operator to copy or hand annotate the work order.

8. Repeat maintenance would be easier to identify if the file entries contained the original job descriptions.

9. The work order number would be useful data to include as part of the Historical Repair File.

10. When possible repeat maintenance is displayed, there is no way to compare it against the jobs just assigned, since the work order has been removed from the display but not yet printed.

Suggestion: Automatically print possible repeat maintenance on the work order.

Suggestion: When creating the work order, check as each job is assigned and show possible repeat maintenance immediately on the bottom of the screen. The operator can then annotate the job on the screen if he feels that it is true repeat maintenance.

b. <u>One-Time Repair (OTR)</u>

1. Model is OK in allowing OTR-exceeded condition to be removed by killing jobs. There may be legitimate reasons for doing this.

2. We need an automated system to come in and change our records to keep one-time repair allowances correct. This is a pain in the neck.

3. Mileage Exceeded and Age Exceeded condition need not be shown on the work order unless the OTR limit is exceeded.

NOTE: This remark was from Hanscom. SAC disagreed, saying that they must always get special repair approval if Miles, Age or OTR is exceeded.

4. Work order should show when OTR-limit is permanently exceeded (replacement code A-D). If it is, the work order should be automatically OTR-suspended at DONE.

5. If OTR-limit is exceeded, print this fact on the shop copy as well as workload control's copy of the work order.

6. When OTR-limit is exceeded, print only approval copy. Print shop copy only on RESUME. Less chance of shop doing the job before approval.

c. Scheduled Maintenance

1. If scheduled maintenance is due, the display should specify whether the criteria met was MILES, TIME, or both.

2. We should be able to see when last oil change, safety, scheduled inspection, etc. was performed - have no visibility now.

3. A Scheduled Inspection is required every 4 months or 4000 miles. The model does not include any Scheduled Inspections.

4. A Safety Inspection, required every 12 months or 12,000 miles, incorporates everything done normally in a Scheduled Inspection, and should therefore update the Scheduled Inspection due date (current VIMS complains if a Safety Inspection is reported before 3 Scheduled Inspections are reported).

5. "We won't be able to overlook scheduled or deferred maintenance any more."

6. LUBRICATION should be charged to M not O.

7. Need to use actual mileage entered during OPEN to check if scheduled maintenance is due. The Scheduled Maintenance indicator in VMF gets set based on estimated mileage computed from fuel

consumption. Actual mileage may show that scheduled maintenance is due even though the indicator was not set.

NOTE: It may be necessary to input latest mileage as part of the calling sequence in order for VIMS to take it into account before presenting the Scheduled Maintenance display.

8. In the case of Accident Repair or any other case where scheduled or deferred maintenance cannot be included, annotate the work order if scheduled or deferred actions are due. This will help to insure that they will be caught before the vehicle is released.

d. Deferred Maintenance

1. "We will not be able to overlook deferred maintenance any more."

2. When a job that was assigned to the work order from the deferred maintenance file is killed, it should be automatically returned to the DMF.

NOTE: This was in the specs for the model but did not get implemented.

e. Mileage

1. When vehicle mileage is input during OPEN, it should be checked immediately against mileage in file. Any unusual discrepancy (e.g. difference greater than 500 miles) should be immediately reported to controller. This will allow him to recheck the reading from the vehicle and will help in early detection of erroneous mileage inputs, broken speedometers, etc.

NOTE: This was one of the most frequent comments made during testing. Apparently the introduction of erroneous mileage for a vehicle is a source of many troubles with today's VIMS. If it is not caught it can foul up the scheduled maintenance calculations, the updating of the vehicles miles/gal. and the replacement code, to name a few. All agreed that it was very important to insure that the correct mileage was being input.

2. As mentioned previously, it was suggested that the vehicle mileage be input during the calling sequence to OPEN, so that VIMS could use it in dynamically calculating whether or not Scheduled Maintenance is due based on miles.

f. Work Order Format

1. Printed work orders should carry a heading or title to identify which is workload control's copy and which is the shop copy.

2. The shop copy of the work order should show:

Engine displacement (cubic in.)
No. of cylinders
Body type/model
T.O. reference

This information would help the mechanic or materiel control to obtain parts. This data would have to be added to the vehicle master record.

3. There should be no limit to the number of jobs allowed on a work order. More than 10 is common in the experience of at least one group. Could easily go more than 20 when performing a detailed LTI (Limited Technical Inspection).

4. If a work order is suspended due to Age, Mileage or OTR-limit exceeded, print on the bottom of the work order a message to the effect:

SIGNATURE REQUIRED - OTR-Limit(or AGE or MILES) Exceeded.

5. Assigned Org. code for the vehicle would be useful on the work order.

6. On larger bases, may need to use five digits for work order number to avoid wrapping around too soon. Otherwise it is possible to catch up and pass an old deferred job.

7. The material cost item on the work order job entry should be 4 digits long. It may exceed $1000 for a single job.

8. The R/D code does not seem necessary on the work order.

9. One group suggested leaving 5 extra job spaces on the work order for writing in new jobs. Another group thought that 2 was plenty. The workload controller said he wouldn't want mechanics writing in more than two jobs without coming to him for approval first.

10. The shop copy of the work order should include space for detailed parts request data.

NOTE: TAC uses TAC Form 305, Parts Request; SAC uses the work order itself.

11. One subject had difficulty in matching material cost and standard hours items with proper job numbers when looking at printed copy of work order. May want to experiment with format changes for legibility.

g. Warranty

1. Assuming a Parts Warranty File, any parts warranties currently in effect for a vehicle should be displayed and/or printed on the shop copy of the work order. It will then be visible when the mechanic goes to get parts.

2. After the current mileage is entered, VIMS should check to see if total vehicle warranty is still in effect and should notify operator. This would alert workload control so decision could be made whether repair actions are covered. (Total vehicle warranty is currently noted on the margin of AFTO Form 271's at Hanscom).

h. Accident

1. The accident estimate work order should have extra job space enough to write in all repairs.

NOTE: Another group said an LTI is performed for accident repairs, and the LTI form is used to detail the repairs.

2. Indirect costs are not charged to an accident.

3. The model will handle accident repair in close parallel to today's manual procedure, but somewhat awkwardly. During testing, the TAC group handled accident repair as follows:

a. Opened a work order with estimating job only.

b. After repairs were itemized by inspector, amended the work order to add the repair jobs.

c. Printed the amended copy, to be sent for approval.

d. Closed the work order, posting the estimating job as complete, and deferring the repair jobs with code D/ACC.

e. After approval, opened a new work order for the vehicle and accepted the deferred jobs (used OPENA for this work order).

4. It was suggested that the model be modified to handle accident repairs in the following manner:

a. Open a type 3 (Special Inspection) work order for the repair estimate only.

b. The inspector itemizes repairs.

c. Close the estimating job work order.

d. Open an accident-type work order (using OPENA) and itemize the repair jobs. VIMS should properly compute estimated costs.

e. At DONE, work order should be ACC-suspended awaiting repair approval.

f. Print copy as in OTR-limit exceeded, and send out for approval.

g. On approval, re-activate with RESUME. If not approved, scrub with CANCEL.

5. The accident repair work order may require 4 or more copies.

6. For ACCIDENT work order, the WORK ORDER TYPE could be automatically filled in as (F).

7. For an accident work order, it should be more prominently identified as ACCIDENT.

i. Suspend

1. In addition to OTR-limit exceeded, need to be able to suspend work orders while awaiting disposition of vehicle, accident or abuse investigations, or approval to repair when age and/or mileage is exceeded.

2. Suspended work orders should be clearly identified as such, together with the reason for suspension. If repair approval is required, the printed copy should indicate that a signature is required and leave a signature block.

j. Miscellaneous

1. Would like to have some record of jobs that the QC inspector (incoming inspection) had to add to the 374 that the vehicle operator should have reported himself. These could be noted on the work order during OPEN (perhaps with an asterisk in the secondary action code field which will otherwise normally be blank).

k. Implementation

1. Workload control may need to override the Management Code as entered on the work order from the Vehicle Master record.

> NOTE: Controller should probably be allowed to override any data in the work order header (including system-supplied Date/Time).

2. Should be able to return to the header portion of the work order after completing the variable entries, to make any desired changes.

> NOTE: Through an oversight, the model does not allow operator to return to the header portion of the work order once he has begun to fill in the jobs.

3. Assignment of Date and Time by the system met with general approval, but most felt that an override capbility was essential.

> NOTE: This feature was specified but not implemented in the model.

4. When paging forward to continue adding jobs to the displayed work order, repeat the last job from the previous page as the first job of the new page, to help operator keep track of where he is in case he gets distracted.

5. Once jobs have been accepted from the Scheduled and Deferred Maintenance files for inclusion on the work order, it should not be necessary to re-accept them on the work order.

6. Several people felt it would be more consistent to accept Scheduled and Deferred jobs with an 'A' rather than a 'Y'.

7. Once a 'Line Accept' for a job is given, software should right-justify all numeric fields, especially the material cost and standard hours items.

8. Should allow vehicle registration numbers to be input with leading zeroes omitted (e.g. 71B00444 or 71B444).

9. It seemed unnatural to use 'Line Accept' to step from the header block to the job assignment block of the work order. May want to use TAB instead.

10. Estimated costs should be updated even though the work center is left blank (the model currently does not calculate cost unless the work center is given, since the cost is based on an average hourly wage for the specific work center).

11. Could software look up the primary system codes (first 2 digits) as entered and fill in the text equivalent in the job description? E.g., a system code of 17x would result in "BRAKES" being automatically inserted in the job description.

12. When action code 'A' is used to assign a job, software could automatically tab over the rest of the action code field since it is always blank for primary code A.

13. When Line Accept is given after assigning the last job on the displayed page, the cursor is returned to the beginning of the job instead of stepping down. Suggest that the cursor be stepped down to the Next Page field, as an indication that the last job was accepted and that a Forward Page is required in order to continue assigning jobs.

2. AMEND

a. Procedure

1. Suggest that when a work order is amended and a new copy is printed, Workload Control throw away their old copy, but staple new shop copy to the old one.

> NOTE: The mechanic(s) may already have annotated the shop copy with mechanic number after completed jobs and with their own tally of hours spent on partially completed jobs.

This suggestion was made in recognition of the necessity for a procedure that will avoid requiring the mechanic to copy over all of his notes if an AMEND results in a new shop copy of the work order.

2. Workload Control should not add jobs to a work order with AMEND without checking the shop copy first to see if the mechanic has written in any jobs not yet cleared through workload control. Otherwise, may end up with conflicting job numbers.

b. Format

1. An amended work order should show that it has been amended, and should give the Date/Time of amendment.

c. Added Features

1. Should be able to AMEND a work order while it is still on VDP without having to take it off VDP first. Suggest using a special call for this transaction, such as AMEND/VDP.

d. Implementation

1. If there is more than one display "page" to the work order: when stepping the cursor from job to job, after the last job on the page, step the cursor to the Page 2 indicator and blink it. If the last job on the page is amended, after the Line Accept is given, step the cursor to the Page 2 indicator and blink it.

2. When Action Code 'K' is used to kill or cancel a job during AMEND, the job is erased and subsequent jobs are moved up to close the gap. This is OK during OPEN, but during AMEND the job should be erased but the gap should not be closed. Mechanics may have already worked on subsequent jobs and may have charged time against them, and therefore they should not be renumbered. Suggest that the job space for the erased job be filled with x's so that it will not be re-used, since it is possible that some time was charged against that job before it was erased. Alternatively, may want to leave the job on the work order, but clearly mark it as void.

3. During AMEND, the checking for repetitive maintenance should be limited to either added jobs or jobs where the system code was changed.

4. After Line Accept, software should right justify numeric fields.

5. During AMEND, should be able to return to the header portion of the work order to change Priority, Work Order Type, etc.

6. Instead of waiting for the WORK ORDER? prompt during the call to AMEND, would prefer to enter the work order number as part of the initial call, e.g.

AMEND 4226

3. CLOSE

a. Printouts

1. We need a copy of the closed work order to give to the Navy, Army, etc. when repairs are made on their vehicles. They need it for their records.

2. The printout of deferred maintenance to be carried in the vehicle should be titled, e.g. "Vehicle Operator's List of Deferred Maintenance."

3. Any time a job is deferred for parts, print the NEW DEFERRED JOBS REQUIRING PARTS notice to materiel control (the model only does this for DEFER/ADD). Materiel control will use this notice when ordering parts, and it can be used as their source document for the PARTS/ADD transaction.

b. QC Inspection

1. One group reported that the union had made them discontinue the practice of tabulating QC-rejected jobs by actual mechanics who worked on those jobs.

2. A QC inspection constitutes a job on the work order, and should be recorded as such.

NOTE: This was not the case for all bases represented. If the inspection is considered a job on the work order, the QC inspector should simply write the job in, using the next available job number, and use this work order/job number when reporting his time on his time card. Workload

control can add the QC inspection job to the work order at the time it is being closed out.

c. Implementation

1. Need to be able to override the system-supplied date and time of completion.

2. If there is more than one page to the displayed work order, after entering the disposition of the last job on the page the cursor should step to the Page 2 indicator and blink it, as a reminder to the operator that there are more jobs to be processed.

d. Procedure

1. According to current procedure, the Action Taken Code is circled by shop personnel before the work order is returned to workload control to be closed out. The way the model is implemented, the person in workload control is determining the Action Taken Code at the time he is closing the work order. May want to return to the circled code technique, since the shop knows best what action was actually taken.

e. Added Features

1. A problem mentioned by several people was the fact that in the present system a work order may fail to close because jobs were reported as done but no time is ever charged against them. One suggestion was to input the mechanic(s) number for each job completed as part of the CLOSE transaction. This could be used in conjunction with labor card data to cross check, to insure that a mechanic actually reports time against all jobs he says he worked on.

2. If the operator at workload control overrides the system-supplied date/time and assigns his own date/time to the CLOSE, the actual transaction time as well as the operator-supplied time should be recorded as a check against time fudging (if the CLOSE time were frequently earlier than the wall clock time, it could indicate time fudging to reduce VOC time).

3. Workload control will need a REOPEN transaction for a closed work order, if it was erroneously closed.

f. General

1. It is helpful that the system allows additional jobs to be entered on CLOSE. This may occur fairly often in real life. Relatively minor jobs are often written in by mechanics but not brought back to workload control for approval before accomplishing.

4. RESUME

a. Implementation

1. When a resume action is taken, the date/time opened on the work order must be updated to the date and time of the resume action. Otherwise the work order appears to have been opened at the time it was suspended.

5. WO/REVIEW

a. Content

1. Entries in the Work Order Status display should indicate if the work order is an Accident, Abuse, Contract or Other Government Agency type.

2. This display should identify work orders open an excessive amount of time.

3. A suspended work order should show the reason for suspension (e.g., SUSPENDED - OTR or SUSPENDED - ACC)

4. May want to show scheduled maintenance actions in house (by work center) as part of the Work Order Status display. This would help to determine work center loading when deciding whether or not to accept scheduled maintenance jobs during work order initiation.

b. Implementation

1. Should be able to page from back to front of the work order file on the display as well as front to back. This would make it easier (faster) to review most recently opened work orders.

c. Format/Sequence

1. In addition to reviewing the file in work order number or chronologic sequence, it would be useful to have the file presented in alternative sequences. For example, present work orders in the following order:

OPEN
VDP
SUSPENDED (OTHER THAN VDP)
CLOSED

2. On the WORK ORDER FILE SUMMARY, the item labeled W/O TYPE is not the former prefix code; it is intended to show Accident, Other Gov't. Agency or Contract Maintenance work orders. This heading is confusing since the Work Order Type item on the work order does refer to what used to be the prefix code.

6. VDP/ON

a. Date/Time

1. Should be able to override the system-supplied date and time for VDP/ON, but there should be some check against possible misuse of the option. It was suggested that the operator be required to include an explanatory code every time he elects to override the system date/time, and that VIMS keep a log of these.

b. Implementation

1. When designating a job as VDP, the program could automatically fill in the secondary action code field with VDP as soon as the operator enters the action code 'S'.

c. Added Feature

1. Need a VDP/REVIEW transaction to allow review of a VDP-suspended work order without removing it from VDP status.

7. VDP/OFF

a. Date/time

1. As with VDP/ON, the operator should be able to override the system-supplied date and time for VDP removal, with the suggested requirement that the operator be required to include an explanatory code whenever he elects to override.

2. If the operator is allowed to supply his own times for VDP/ON and VDP/OFF, the system should check to insure that the vehicle never gets charged with VDP twice for the same time. In particular, if a vehicle is taken off VDP and then put back on, make sure that the times run consecutively and don't overlap.

3. The date and time of VDP removal should be properly identified on the displayed work order as OFF VDP (the model identifies it as COMPLETED, which is intended to designate the time that the work order is closed).

b. Automatic VDP/OFF

1. When a PARTS/CHANGE shows that all necessary parts have arrived for a VDP vehicle, the vehicle should automatically be removed from VDP status. The time off of VDP should be the actual date/time of part arrival. The PARTS ARRIVAL NOTIFICATION to workload control should show the vehicle as being removed from VDP, the date and time that it was taken off of VDP, and should give the number of the open work order.

8. DEFER/ADD

a. General

1. Many people voiced concern because the DEFER/ADD results in a deferred job without a work order number (the model assigns dummy work order number XXXX). Most said that a work order number was necessary to order parts.

> NOTE: A procedures change is required that would allow parts to be ordered directly against a vehicle. When jobs are deferred for parts with DEFER/ADD, the NEW DEFERRED JOBS REQUIRING PARTS notice that is printed out can serve as proof that the parts are being ordered legitimately against the vehicle.

b. Parts Requirement Notice

1. The NEW DEFERRED JOBS REQUIRING PARTS notice should be printed on the terminal printer in materiel control.

2. VIMS should look up in the vehicle master file and print on the NEW DEFERRED JOBS REQUIRING PARTS notice the

Engine description (size, no. of cylinders)
Vehicle type
Model/Body type
T.O. Reference
Automatic or manual transmission

and any other information available in the vehicle master record that will aid materiel control in ordering the parts.

c. Procedure

1. TAC: It is unlikely or rare that DEFER/ADD will be used to defer work for parts. More likely used to defer work for lack of personnel. In order to defer for parts, we generally require that the vehicle come into the shop and we will open a work order to at least determine for ourselves what parts are actually required. Jobs will then be deferred under that work order.

SAC: We use the operator care centers for incoming vehicle inspection. We can determine a vehicle's need for parts at the operator care center before a work order has been opened, and would probably use the DEFER/ADD quite frequently to defer jobs for parts without opening a work order.

d. Implementation

1. The model software will not allow the operator to return to an entry on the displayed form once he has indicated it to be complete with a Line Accept.

NOTE: This was an implementation oversight in several transactions in the model. The operator should, in general, have complete freedom to return to any line or

entry and be allowed to alter or modify it before terminating the transaction.

9. DEFER/CHANGE

a. Added Feature

1. An option should be provided for obtaining a new printed list of deferred jobs to give to the vehicle operator, to insure that his list is accurate.

10. DEFER/DELETE

a. Added Feature

1. If DEFER/DELETE is used to delete a job that was deferred for parts (DFP), a notice should be printed to materiel control so that they can take appropriate action on cancelling ordered parts and updating of back-ordered parts file.

11. PARTS/REVIEW

a. File Content

1. The Back-Ordered Parts File (BOPF) entries should show which parts are ordered for VDP vehicles.

2. Each entry in the BOPF display should leave room enough to show FSN, Part Nomenclature, and Document No. if ordered from supply.

3. Include Order Invoice No. in BOPF entry.

4. Show priority under which part was ordered (is FAD code any help?).

5. Show date of last follow-up action on overdue parts (priority and date of last follow-up will be especially important in the VDP Summary). For supply ordered parts, also may want to include a 2-character alpha code (from D18 report, showing delivery status???) and 3-digit Julian EDD.

6. Show cumulative cost for entire file, broken down by source (COPARS, Supply).

7. Costs entered in BOPF for supply ordered parts are for estimate only. Actual costs will be charged to vehicles when VIM cards from the 1050 are processed.

b. Format/Sequence

1. BOPF should be sequenced on Vehicle Reg. No.

2. Each page of the BOPF display should be identified as Page m of n, in order to know how long the file is.

c. File Size

1. The BOPF may be very large (several hundred entries). The open format on the display is easy to read, but would take a long time to pass the whole file in review. Probably would use a paper copy of the file for reference most of the time.

d. Added Features

1. PARTS/REVIEW should have an option that allows addressing a specific vehicle by Vehicle Reg. No., to avoid having to page through the file when the vehicle no. is known.

2. PARTS/REVIEW needs a print option.

NOTE: If the file is very long, it is probably a good idea to print a fresh copy of the file during a night run, to be delivered each morning to materiel control.

12. PARTS/ADD

a. General

1. Is it necessary to give the work order number as part of the entry? There is none if the job was deferred using DEFER/ADD.

b. Implementation

1. A DITTO function key would be useful in PARTS/ADD.

2. On second and subsequent entries the software could repeat the work order number automatically as it does now with the vehicle number.

3. Would prefer to have the form displayed a line at a time as needed, rather than having to wait for a full form to be displayed.

4. Would like a system-supplied date as an option.

5. Need more space for part nomenclature.

13. PARTS/CHANGE

a. Procedure

1. Transmit the PARTS ARRIVAL NOTIFICATION directly to the workload control terminal printer.

b. Added Features

1. The PARTS/CHANGE transaction used to report receipt of parts should include the actual date/time of receipt of parts.

2. The PARTS ARRIVAL NOTIFICATION should show the actual date and time of receipt of parts. Also, the headings should be corrected to show DATE RCVD (it now says DATE ORDER).

3. In addition to keying into the file by vehicle number, would it be possible to key on vendor invoice number or supply requisition number?

4. If all parts arrive for a particular job, VIMS should check to see if the vehicle may already be in the shop. If so, the PARTS ARRIVAL NOTIFICATION should say so, and should give the number of the open work order. Workload control can then call up the work order and add the deferred job while the vehicle is still available.

5. When materiel control enters the arrival of the last part for a VDP job and no other VDP jobs for that vehicle are still awaiting parts, the vehicle can be automatically taken off VDP. In this case, the PARTS ARRIVAL NOTIFICATION directed to workload control should show the VDP removal action and give the date and time that it was taken. The VDP removal time should be the actual receipt time for the part, which may differ from the transaction time.

c. Implementation

1. PARTS/CHANGE transaction needs a DITTO key.

2. The BOPF should be sequenced by vehicle number.

3. The model doesn't recognize a bin location with an alpha character as the first character.

4. The bin location field should be 4 places to allow the use of the 'P' suffix showing partial availability of parts for a vehicle.

> NOTE: This comment was made several times. In fact, the 'P' suffix will no longer be needed, because entries in the deferred maintenance file will now be by individual job. Whenever all parts for a single deferred job have arrived, the bin location will be filled in, to indicate that the job may be done. A blank bin location implies that all parts necessary to accomplish that specific job have not arrived.

14. PARTS/DELETE

a. Implementation

1. Special case - if for a given job the BOPF shows that all parts except one have arrived and are binned, and the remaining part is DELETED, VIMS should recognize this as a completed order and should generate the PARTS ARRIVAL NOTIFICATION.

15. PARTS/ISSUE

a. Format

1. The wording is confusing on the display in the line that identifies the work order against which parts are being issued. Suggest changing it to read "CHECK THOSE PARTS TO BE ISSUED AGAINST WORK ORDER nnnn".

b. Implementation

1. Should have an option for direct entry into BOPF for this transaction rather than requiring the operator to page through the file to find parts being issued. Suggest a transaction call such as

(ATTN)
TRANSACTION ?
(PARTS/ISSUE)
WHAT WORK ORDER NO. WERE PARTS ISSUED TO?
(4227)
WHAT VEHICLE WERE PARTS ORDERED FOR?

If no vehicle is given, the operator would be required to page through the file as he does now. If the vehicle is given, VIMS would locate and display all parts ordered against that particular vehicle.

c. Added Feature

1. On PARTS/ISSUE, check if part was issued to the vehicle for which it was ordered. If not, wipe out the bin location from the deferred maintenance file entry and remind materiel control to reorder the part for the original vehicle.

d. Procedure

1. Need to be able to recover gracefully when a back-ordered part is drawn out by a mechanic who then discovers that the wrong part was sent.

2. The PARTS ARRIVAL NOTIFICATION shows details of all parts and bin locations. Workload control can keep this on file, and give it to the mechanic when the vehicle returns and a new work order is cut. The mechanic in turn can present this to materiel control when collecting the parts for installation, and materiel control can use this as the source document for the PARTS/ISSUE transaction.

3. Do not use the PARTS/ISSUE to make actual charges against vehicles. The costs in BOPF should be used for information and estimating purposes only. Use BOPF only for keeping status of parts and for notifying workload control of parts availability. Cost for parts obtained through COPARS will be charged to vehicles when the sales slips are processed, using the COPARS transaction. Costs for parts obtained through base supply will be charged to vehicles as they are now, when the VIM cards from the 1050 are processed by VIMS.

16. HCBS/REVIEW

a. File Content

1. Include a code in the HCBS master file to show whose bench stock each item belongs to (Tire Shop, Battery Shop, Allied Trades, Refueling, 463L, ...)

2. Expand nomenclature to a more intelligible form.

3. Add I&S code (Interchangeability & Substitution). E.g.,

M1008 (Master)	G78 x 15 tire
I1008 (Interchangeable)	750 x 15 tire
I1008 (Interchangeable)	855 x 15 tire

b. File Sequence

1. Need alternate sort sequences for the HCBS master file. E.g.,

a. Group all tires by tire size
b. Sort on FSN
c. Sort on Item Number

c. General

1. The file as displayed by HCBS/REVIEW is very dense and hard to read. Question its usefulness. Probably would use the printed copy most of the time, since the file tends to change slowly.

17. HCBS/ADD

a. Implementation

1. If an item is deleted from the HCBS Master file, the item number could be reused if it was given a progressive alpha character, e.g. 90, 90A, 90B, 90C, etc.

> NOTE: This comment was made because the model does not allow one to reuse an item number after an item is deleted. New items are automatically given the next higher unused number. This was done to avoid the possibility of having "Q-cards" in existence with the same item number but for different items. The volume of deletions and additions to

the HCBS master file appears to be low enough so that it should not be necessary to reuse numbers.

b. Added Feature

1. When adding an item to the HCBS file, check to be sure an item with the same FSN isn't already in the file.

18. HCBS/CHANGE

a. Added Feature

1. A HCBS/CHANGE should allow for generation of new "Q-cards" since data has changed.

19. HCBS/DELETE

a. Implementation

1. We need to have a method of purging the file of deleted items so as not to keep assigning numbers infinitely.

(See note under HCBS/ADD, Implementation)

2. May want double verification to avoid inadvertent deletions. HCBS/DELETE does not show the item, it simply informs the operator that the designated item has been deleted. May want to display the item first and let the operator see what it is before deleting it.

20. HCBS/ISSUE

a. Added Features

1. Can quantity on hand be tracked and made available to the operator?

b. Procedure

1. Probably not any reason to continue to use punched cards as Q-cards. Could just be printed.

c. Implementation

1. The displayed form should be in the same order as the source document.

21. COPARS

a. Display Format/Content

1. On COPARS sales slip entry form, remove the WNTY MILES item (warranty is always for a specified length of time only), and add a DATE OF WNTY item since the date of warranty may be different from the date of the input transaction.

2. The COPARS entry form should include an item for Charge Code (O,M,N).

3. The COPARS invoice number should be part of the input data. Slips are filed by invoice number (both vendor and materiel control). This will enable us to locate invoice and prove warranty on parts. The invoice number (5-digits) should also appear in the Parts Warranty file.

4. The displayed form should match the order of items on the sales slip.

5. The COPARS sales slip display should show the vehicle reg. no., the make/type and the engine displacement.

6. The job number should be included as a data item for each part.

7. The WNTY indicator data item on the COPARS input form is redundant. An entry in WNTY DAYS implies special warranty.

8. Would like the form on the display for COPARS input to be a facsimile of the COPARS sales slip. It would be easier to fill in.

9. Although parts warranty data may be printed on work orders, show the parts warranty data on the display at finish of COPARS transaction (use split screen showing both COPARS sales slip data and parts warranty data). Use this for updating the Parts Warranty file in the case where an item in PWF is replaced by a later warranty.

NOTE: If warranty data is entered for any item on the sales slip, at the end of the COPARS transaction VIMS should scan the Parts Warranty file and display all current part warranties for the vehicle, using a split screen. If the operator finds that an item on the sales slip is a replacement for a part under warranty, he should X the warranty on the display, causing VIMS to remove it from PWF. The new warranty information will be added to PWF as a normal part of COPARS processing.

NOTE: If the above case is simply an exchange of a part under warranty, the cost should be left blank when entering the item on the displayed sales slip form. The warranty information will be used to update the Parts Warranty file in the usual fashion, but no cost will be charged to the vehicle and the item will not be part of the A&F output record.

b. Funds

1. Need to address how to handle additional charges, freight charges, telephone charges, Non-Price Listed (NPL) items surcharge, adjusted prices and credits.

2. Materiel control would like to have the system maintain a running balance of remaining monthly COPARS funds. This might be queried and/or shown on COPARS sales slip input display, and updated after each sales slip is input. Should program in the algorithm to properly account for NPL service charge which is a function of the NPL total cost.

c. General

1. Accumulation of COPARS data is easily accomplished and will serve many purposes: Procurement requirement, A&F funds, back-ordered parts status, VDP status, audit trail, contractor performance, etc.

d. Procedure

1. Need to get warranty update into PWF for items that were simply exchanged under warranty. Have COPARS make out a sales slip showing exchange only, and use this as source document for update of PWF (see note under item 9 of Display Format/Content paragraph above).

2. The date on COPARS slips should be Julian date.

3. If replacing a part under warranty, print a management notice in workload control. (??)

4. There may be an item on a COPARS sales slip to cover freight charges.

5. On the transaction prompt, allow entry of work order number or vehicle number. Use work order number for direct issue and vehicle number for back-ordered parts. Also allow for a blanket work order number such as H8888, to accomodate sales slips made out for parts acquired for high cost bench stock rather than for a specific vehicle.

e. Implementation

1. All numeric fields should be right-justified by the computer after they have been entered.

2. Software should check date, and question any slip that is more than five days old.

3. Allow for entry of a discount percentage with fractional value (e.g. 33 1/3%).

4. If a given discount percentage value is the majority case, it could be made a default case for input.

5. Since COPARS slips will likely be entered in a batch, at the end of the transaction software should cycle back for another slip and not return to the top level. On recycle, software should erase the data from the display but could leave headings and date (allow for override of date if desired).

6. Do not display entire blank form at the beginning of the transaction. Build the form a line at a time, as needed.

7. The model would not allow operator to return to a previously entered line to make corrections.

NOTE: Implementation oversight.

22. FUEL

a. Error Checking

1. Enter the fuel tank capacity for each vehicle as part of the vehicle master record. When inputting fuel consumption data, question any fuel quantity that exceeds the vehicle's tank capacity.

2. Question any oil quantity over 2 quarts.

b. Implementation

1. Delete or redefine the action of the QUIT function key during this transaction. Otherwise, may wipe out many entries.

2. Like the result of the DITTO key, but it should be easier to use.

NOTE: Everyone liked having a DITTO key that would automatically repeat the field above. The choice of key for the function was unfortunate. The quote mark was selected, which requires operation of the SHIFT key.

3. Numeric fields should be right-justified as soon as a Line Accept is given.

4. Enter the date only once and assume it repeats for each entry unless it is specifically changed.

5. The Issuing Org. and Date fields could be "auto-duped".

6. The model would not allow the operator to return to a previously accepted line to make corrections.

7. In the error message that questions fuel and oil quantity entered, change "INVALID" to "QUESTIONABLE".

c. Input Data

1. A separate transaction (FUEL/OB) ? is suggested to handle the reporting of off-base fuel issue. In this case it is necessary to enter total cost of gas and oil, whereas cost is not required when reporting on-base issue.

2. Need space to enter the Using Org.

d. Display Format

1. Revise the FUEL input displayed form. Include the following items from left to right:

Vehicle	- 8 characters
Assigned Org	- 2 characters
Fuel(gals)	- 2 digits (whole gallons)
Oil(qts)	- 1 digit
Date	- 5 digit Julian (blank means repeat)
Issuing Org	- 2 characters (blank means repeat)

2. Make the fuel quantity field 2 digits. Only enter whole gallon amounts (the automatic fuel pump data is only whole gallons now).

3. Data entry would go much faster if the operator didn't have to keep repeating the date. Suggest it be entered only once and carry forward until changed.

e. Added Features

1. Would like a log of all FUEL entries that resulted in error messages, including an indication whether each such entry was cancelled or whether the operator forced its acceptance.

2. Would like a log (in Using Org. sequence) of batch input. Compute and show total gallons of fuel and total quarts of oil by Using Org.

3. Should be able to roll back to previous pages of FUEL entries for review.

4. Need some signal to notify the operator that an entry has failed one of the error checks. If he is not watching the screen he may miss the error, and may enter the next line on top of the previous one. Suggest an audible signal that coincides with the error message and persists until the operator clears it with a CLEAR key.

23. TIME/INPUT

a. Employee I.D.

1. Most felt that TIME/INPUT was slow in moving from man to man. Instead of being prompted by employee name in alphabetical sequence, it was suggested that the operator identify each employee using a 3-digit employee number (most suggested using the last 3 or 4 digits of the SSAN). This would be faster and would not require the time cards to be pre-sorted before entering a batch.

2. If 3 or 4 digit employee I.D. number is used there will no longer be any need for a distinction between batch input and single employee input.

b. Implementation

1. The date should be entered only once as part of the transaction call, and should be carried forward throughout the transaction from employee to employee.

2. The legality of the shift code should be checked.

3. The DITTO function should work the same as it does in the FUEL transaction. It should repeat the actual data, not simply leave DITTO marks.

4. Addition in TIME/INPUT is only accurate to .1 hrs.

NOTE: Becuase of problems with the arithmetic package used in model software, the validity checking routine would accept 7.9 or 8.1 hours as 8.0 hours of first shift time.

5. Allow time to be entered as 2 digits, with decimal point understood between them.

6. As soon as shift code is entered, do an automatic carriage return and line feed to position the cursor at the start of the next line (see Format, item 1, below for suggested redesign). Prefer to always enter shift code and have automatic step to next line, rather than leaving it blank to indicate no change and having to use Carriage Return to step to next line. By always entering it rather than only when it changes, the operator actions are more consistent and mechanical and require less thought.

c. Format

1. The displayed form in TIME/INPUT needs to be redesigned to follow the same sequence of data items as the time cards. Should be able to specify the date at the beginning of the transaction and have it carry forward from employee to employee unless specifically changed. Reorder the displayed form to show from left to right:

Work Order No.	(4 digits)
Job No.	(2 digits)
Time	(2 digits)
Shift Code	(1 digit)

NOTE: Subjects experimented with this revised format during the testing period, and found it to be much easier to use than the format that was implemented in the model.

d. Keyboard

1. TIME/INPUT would be much easier if the TAB, DITTO and DONE function keys were located with the numeric keypad cluster. It would allow holding the source document in one hand while entering the data with the other.

NOTE: The CRT used for testing has a numeric key cluster on the right of the keyboard which may be used in lieu of the numerics that are part of the standard typewriter layout.

e. Added Feature

1. R&A would like to have some sort of end-of-day closeout that would show any employees who have not yet submitted a time card for the day.

2. Should be able to recall for examination and/or correction an employee time card input, even if it has been accepted and processed.

3. In resolving time card errors, need to be able to get back into CLOSED work orders to make corrections (e.g. job on work order that in fact was not done and hence has no time charged to it). Necessary only for work orders closed less than 6 days.

4. Should be able to print more than one copy of the Error Suspense File. R&A needs a copy, and will probably want another to send to shop supervisors. May want to shred out a second copy by work center.

5. Can software check for work orders with jobs left hanging with no time charged aginst them? In current VIMS this is a frequent cause of work orders failing to close properly. Suggest a list of all work orders closed over 2 days without time charged against all jobs.

24. TIME/EDIT

a. Added Feature

1. R&A would like an ESF/REVIEW transaction, to review the time card input Error Suspense File.

25. VDP/SUMMARY

a. Display Content

NOTE: Although the VDP/SUMMARY transaction was not tested, it was discussed by some of the subjects, and the following comments record their suggestions regarding content of the VDP/SUMMARY display beyond that which was specified on paper.

1. For each part, show DATE DUE/RECEIVED and BIN LOCATION if received.

2. Add FSN and Document No. for supply-ordered parts.

3. For each vehicle, show the number of days and hours on VDP. Useful for standup briefings.

4. NORS vehicles on VDP - NORS vehicles can be identified as such in the vehicle master file. The VDP Summary should have a separate breakout of NORS-reportable vehicles.

26. WARRANTY/UPDATE

NOTE: This transaction was not implemented in the model.

a. General

1. Need a PARTS WARRANTY REVIEW capability, and a general update capability.

2. Need to provide for updating the parts warranty file with special warranty data for supply-ordered parts.

3. Need a parts warranty update capability separate from the sales slip transaction.

27. SPECIAL INQUIRIES

a. Special Inquiries and Reports

1. Workload control would like a query capability that would allow them to review the internal 271 for any vehicle, to review such items as TCTO history or special inspection data.

2. R&A would like to be able to obtain a weekly QC INSPECTION SUMMARY. Sample Format:

Date	WO #	Job #	Action Code	Sys Code	Work Ctr	Mech
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.

Total W/O Closed	____
Total W/O Insp.	____
Total Rejected	____
% Inspected	____
% Rejected	____

3. Workload control - Will the system compute a VDM summary daily so I don't have to do it manually? I spend a lot of time preparing this at commander's request.

4. Should be a capability to query the data base to tie VEHICLE to WORK ORDER NUMBER to JOBS to COPARS INVOICE. This trail could be used for audit trails to verify parts installation requirement by I.G., auditor, Vehicle Maintenance Superintendent, etc. (Reviewing personnel said this happens frequently).

5. Maintenance control would like an inquiry capability against old work orders that would allow one to identify all parts (and their source) that were obtained under that work order.

6. Workload control would like to be able to retrieve past work orders for a vehicle. This data is usually needed while the vehicle is in shop, generally within 1/2 hour or less from the time requested. Currently this is done by requesting R&A to pull old copies from their files.

7. Need a capability for materiel control to screen the BOPF for availability of specific part to avoid VDP on another vehicle (cannibalization from the BOP bins). Currently done by searching

for parts ordered under the same Management Code and for the same vehicle year.

8. To investigate repeat maintenance, need a search and retrieve capability against Historical Repair file. E.g., all replacements of muffler (system code 084) on Chevy pick-ups for past six months (specify Management Code to indicate type of vehicle).

28. KEYBOARD

a. Numeric Layout

1. Subjects were divided on preference for numeric keypad over the typewriter layout of numerics. Generally, those with more typing experience gravitated toward the typewriter layout. R&A and materiel control tended to use the numeric keypad more often.

2. Two people from R&A thought it might be convenient to have an alternate layout of numerics in the same position as numerics on the keypunch.

3. One subject liked the numeric keypad but complained about the inconvenience of having to return to the alpha keyboard to enter the embedded alpha character in the vehicle registration number.

b. Key Glare

1. One subject complained about annoying glare from overhead lights reflecting from the keycaps.

c. Function Keys

1. Two subjects suggested that the QUIT function key be isolated from other function keys to reduce the possibility of hitting it accidentally.

29. GENERAL

NOTE: The remaining comments include those which seemed worthwile recording but did not fit easily into any of the previous categories.

1. If the wrong COPARS part is received, need procedures that will allow one to

a. cancel the charge to the vehicle

b. place the job back on deferred status (showing part not arrived)

c. notify materiel control to get COPARS credit

2. At Hanscom, the incoming vehicle inspector fills in the work order and brings it to workload control for completion.

3. Workload control needs to have better feedback from mechanics to show exactly what maintenance was performed. It would help often times to explain what otherwise seems to be excessive labor, and would help in maintaining better historical repair records.

4. If a vehicle is OTR-suspended, do not allow another work order to be opened. Could be allowable if ACC-suspended, but should at least question.

5. "Workload control will need a quiet environment to be able to concentrate on what he is doing at the terminal".

6. Should be able to recall for viewing any work order regardless of status, as long as it is still in an on-line file. Includes work orders that are

OPEN
SUSPENDED (OTR, VDP, ACC)
CLOSED (less than 6 days)

7. All numeric fields should be right-justified on printouts.

8. Prefer to have all forms displayed one line at a time, with new lines given as needed. Much faster than waiting for a full form to be displayed.

9. A single character call to transactions would be easier and faster once familiar with transactions.

10. Workload control is concerned with doing away with the 271 Vehicle Historical Record. It contains much information that would still be required.

Vehicle Warranty
Parts Warranty and Parts T.O. Reference
Repair History
TCTO Actions
Undercoatings

Wheelbearing Repack
Special Inspections

11. The Standard Hours Estimates on work orders are very questionable. They very often are grossly off from the time actually spent on a job, for legitimate reasons. Generally not a good idea to use these as a basis for policing the mechanics. Should be used for load planning and estimating purposes, not as a club to hold over the shop personnel.

12. In the case of disposition of a vehicle, need a cleanup procedure to purge the system of back-ordered parts, pending jobs, scheduled maintenance, parts warranty, etc.

13. R&A will need a capability to update the Employee Master File (e.g. new employee, deletion of employee, change of work center assignment, etc.).

14. There should be a capability to void or cancel a work order once opened. This could arise, for example, due to mission requests.

15. Should be able to print any currently displayed image; for example, the scheduled or deferred maintenance displays for a given vehicle as they appear during OPEN.

16. Itemizing to the individual job level may result in a very large deferred maintenance file.

17. May be able to do away with the vehicle SERV-O-PLATE.

18. An outlying work center could have a printer only; they could call in for a work order and have it printed out locally.

19. Do not allow extra job space on a work order that requires special approval. (In manual system, extra job space is stamped out to insure no unauthorized jobs are added on after approval).

20. Pease has a fleet of 487 vehicles. An average of 300 deferred work orders on approximately 200 vehicles, with an average of 2 line items per work order. Pease has an estimated 400 - 500 back-ordered parts at any given time.

21. Dover has a total fleet of about 650 vehicles, of which 465 are registered.

22. SAC uses operator care centers for incoming vehicle inspection.

SECTION VI

SUMMARY

SPECIFIC DESIGN GUIDANCE

The primary result of testing was the accumulation of a large volume (see Section V) of specific guidance that will serve as input to the development of specifications for a full prototype of on-line VIMS. As pointed out earlier, the feedback from testing reveals that there are some major changes to be considered. Careful study and review of comments from testing is recommended. Major modifications should be validated if possible by discussion with functional personnel.

GENERAL DESIGN GUIDANCE

In addition to the specific guidance referenced above, the testing pointed up a number of more general design guidelines that merit a separate mention.

a. Display formats should be designed to match source documents. This is especially important when displaying a form for data entry. The data entry task is much easier if the items on the input form are in the same sequence as they are on the source document.

b. When displaying a form that allows for multiple entries, it is more efficient to build the displayed form one line at a time as needed, rather than initially displaying a multi-line blank form.

c. From the operator's veiwpoint, it is expedient to be able to enter numeric data without concern for field justification (e.g., allow entry of 08, 8, 8., 8.0). However, once the data has been accepted, software should right justify all numeric fields for better legibility.

d. As nearly as possible, the operator should have as much freedom when filling in forms on the display as he would have when filling in a form with a pencil. That is, he should be allowed to space around at will, to erase and correct, to skip entries or return to previous ones, to enter items out of sequence, or even "tear up" the form and start again.

e. Don't build in overly restrictive self-protection. Trust the operator to know his job. For example, don't disallow override of system-supplied time/date because it might be used to fudge VOC time. Allow the override, and if necessary keep a management log of all exceptions. Unnecessary restrictions are a frustration to operators who must find ways of "getting around" the system in order to accommodate real life exceptions.

f. Even though a transaction has been completed, there should be a provision for the operator to undo or nullify it, for whatever reasons he may deem it necessary.

g. The use of labelled function keys is recommended. Care must be taken to insure that the meaning of individual function keys remains consistent from one transaction to another.

h. When designing formats for presentation of data on the display, keep them open and uncrowded for better legibility. Lists and tables are much easier to read if they are double spaced.

i. Titles should be used liberally on displays and printouts, so that they are easily identified and as self-explanatory as possible.

j. A general print capability should be provided, that would allow an operator to obtain a printed copy of any static image on the CRT.

k. Data entry should be reduced to a minimum, by

- Using internally retrieved data wherever possible.
- Implementing a DUP or DITTO function.
- Implementing an implied DUP wherever possible.

POTENTIAL USER ACCEPTANCE

As may be seen from the subject evaluations in Appendix I, user acceptance was surprisingly good. We were prepared for more resistance to change than we encountered. In retrospect, we feel that this acceptance may be attributable to the following reasons:

a. The proposed on-line capability does not represent a major departure from current procedure. The operator's use of the terminal is primarily to assist him in completing tasks which he is

already performing in the manual system. As a result there is a strong parallel between present and proposed methods.

b. In addition to keeping the vehicle maintenance management data more current and accurate, the transactions generally offer some direct and immediate benefits to the operator, such as performance of file look-ups, automatic calculations, immediate error checking, automatic posting, etc.

c. The operator's view of the on-line system that was promoted, that of a "fast file clerk" to assist in performing designated tasks, leaves the operator with the feeling that he is in control rather than being driven by the computer. This was enhanced by the fact that the operator could always resort to the QUIT function key at any time to nullify any transaction no matter how far he had progressed with it (short of actual completion).

Comments made by subjects during testing and in their evaluation folders indicate that they were pleased with the responsiveness of the model. It should be noted that the model represented probably the optimum in responsiveness, since 1) it was run on a dedicated computer, 2) the data files were small, 3) the line speed between terminal and computer was 2400 bps, and 4) the high speed printer was used during testing.

To the extent that any of these factors may degrade in actual implementation, the responsivness will degrade accordingly. This will certainly have an effect on user acceptance, and there is a point where response can become so poor as to make the system totally unacceptable to a user regardless of the other benefits it may offer.

While this testing made no attempt to measure user tolerance to degraded response, this is certainly an important factor to be considered in subsequent design and implementation planning.

THE MODELING APPROACH

Finally, we feel that the development of the model and the subsequent testing of the model by functional personnel has shown this to be an effective approach to system design. Construction of a model forces system designers to a level of detail that is harder to accomplish on paper alone. It also forces early consideration of the relationships and interdependencies of the pieces of a system.

The model proved to be an excellent vehicle for involving potential users in design discussions. Although imperfect, the model is tangible and is far more thought stimulating than a design document. By getting potential users really involved in the early stages of system design, there is a much better opportunity to shape a final system that will be responsive to user needs. The resulting final system will require fewer modifications and retrofits, and should meet with wider user acceptance by acknowledging more closely in the design the real world in which it will operate.

APPENDIX I

SAMPLE COMMENTS FROM EVALUATION FORMS

1. What is your opinion of paperwork and data management in Vehicle Maintenance?

"The Vehicle reporting system in use today (VIMS) is a workable system, but too much time must be spent making it so on a day to day basis.....In R&A, too much time is spent as a bookkeeper, and making the system work. VIMS is too open to errors. The lag time from source to end product is too long."

"Too slow in processing the paperwork due to the number of people that is involved."

"Workload control has seven different listings to check just to open a work order....

2. What was your initial impression of the model?

"I was very impressed. It's the type of system we have needed for a long time."

"I was under the impression that it was going to be very complicated and confusing, not ever having any affiliations with computers before this day."

"I was impressed by the overall speed. The way of eliminating errors was really outstanding."

3. Were you uneasy or relaxed at first and did this feeling change?

"I was uneasy to some extent, but soon realized that I had visualized a system more complex than actually was being introduced. Uneasiness decreased considerably when the model of the system was shown, and by noon of the first day I felt completely at ease..."

"I was a little uneasy, as I am not a typist, and the keyboard made me a little nervous. But within the first hour of operating the keyboard I was really surprised at the ease of and the speed I could write a work order."

4. What was the hardest area for you to get used to?

"Knowing what keys on the keyboard to use and learning the location of them."

"Not having the paper work in my hand and knowing that I have the control."

"As an R&A type, not having immediate access to what was going on in the shop maintenance and materiel control such as I am accustomed to having, although it's always after the fact."

5. What were your main likes and dislikes?

"My main like is that it will move most of the input to its source, and give maintenance fast response to their input, and give R&A more time to do their real job."

"The speed and legibility of all transactions and not having to check listings or cards for all static data."

"The speed of transactions. The information appears before you on the CRT which will cut down on hours a day by not having to check all the listings."

"My dislikes...pertain to... the lack of seeing how our present A, B, C, and 272 cards, or formats will look in the new system, as there is not enough vehicle static information in the present system. And I believe the headings need realignment."

6. What do you see as the main to least benefits?

"Never lets you forget or overlook scheduled maint.-deferred parts, etc."

"Immediate recall of all deferred, repeat and scheduled maintenance when opening a work order that might be overlooked under the present system."

"Managers will have current information available as needed. Maintenance Control will have the most current information available to them at all times."

"Workload Control will have more information quicker with less chance for error. ... Materiel Control will have more current

information to work with. A knowledge of all Deferred transactions."

7. What areas were in most need of improvement?

"Accident work orders."

"Manhour reporting."

"The work order should contain as much information as possible as to the description of the vehicle components such as body type, wheel base, engine size and no. of cylinders. Also, the parts manual number should be noted on the initial work order for the mechanic's reference when ordering parts."

"Further research should be done in the manhour accounting system to insure that the mechanic did actually work on the vehicle .... A big headache in manhour accounting now."

"Some of the information should be rearranged to a different place. Warranty Parts, for example..."

"At this stage I think more retrieval capability is needed."

8. How do you think others will accept this concept of data handling in maintenance?

"I think as a whole this system will be accepted by all maintenance personnel, but of course you will always find your hard heads that don't like to change..."

"It will take some convincing to get people to rely on the system as it did under the 3500 system. Most will not want to do away with the status boards, but if a listing or listings are run once a week if necessary, as a backup, I believe they will see the advantages of the system quicker."

"I think acceptance of this concept will be easy."

"The overall majority will at first not trust the system. I feel after seeing it operate most maintenance managers will like the system."

"I think initially that acceptance will be cautious and perhaps slow, but I think training and exposure will eliminate this initial apprehension."

9. Do we need this system? Why?

"VIMS is workable, but the lag time makes a lot of its products useless in Workload Control and Materiel Control. This system will give fast ... service in both these sections."

"Yes. In order to be able to give the maintenace controller the most current data at the time he is opening a work order."

"Definitely yes, because it is so much simpler and faster than the present system. It also saves numerous hours of maintenance control time."

"Yes! It provides us with immediate processing of maintenance and operations data, and history data elements required for management decisions in a quick and less costly way."

NOTE: There were no negative responses.

10. Do you have any other comments?

"I can see big improvements in the Vehicle Maintenance reporting system by using this model system, and would enjoy working with it."

"I enjoyed being involved in the test program; however, I would like to be involved in the final development of the program and help put it into the field."

"I will be glad to see this system installed as quickly as possible."

"Should be put into use as soon as possible, as it will be very cost effective to the USAF."

"I think it would be beneficial to include people from the field in other areas of development of this concept such as the group rewriting procedures, and establishing analysis and reporting requirements and procedures."